REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES OF AGRA AND OUDH.

FOR THE YEAR ENDING ~~30th JUNE 1907.~~

1905-06 to 1909-10

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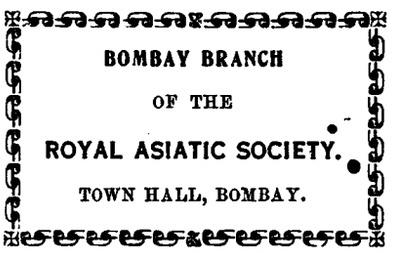

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TABLE OF CONTENTS.

CHAPTER I.—PREFATORY.

Paras.		*Pages.*
2—3	Officers on the staff	1
4—8	Tours of officers	1—2
9	Special features of the year's work	2—3

CHAPTER II.—ARBORICULTURE.

10	Summary of work done	3
11	Working plans	*ib.*
13—14	Financial results	*ib.*

CHAPTER III.—ASSISTANCE GIVEN TO THE PUBLIC.

15	Distribution of implements	4
16—20	Distribution of seed	4—5
21	Seed for famine-stricken districts	5—6
22—28	Improvement of the production of cotton	6—7
29—32	Well sinking	7—8

CHAPTER IV.—SUPPLY OF INFORMATION.

33	Publications	8
34—35	Agricultural journal	*ib.*
36.	Summary of correspondence	9

CHAPTER V.—ASSOCIATIONS, SHOWS AND DEMONSTRATIONS.

37	Meeting of Court of Wards Managers	*ib.*
38	Agricultural associations	*ib.*
39	Agricultural shows	*ib.*
40	Cattle shows	*ib.*
41	Meerut demonstration farm...	*ib.*
42	Private demonstration farms	10
43—45	Sugar factory	*ib.*

CHAPTER VI.—AGRICULTURAL EDUCATION.

46—48	The agricultural school	10—11
49	Other educational questions	11

CHAPTER VII.—MISCELLANEOUS.

50	Labour question	*ib.*
51—53	Conclusion	*ib.*

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES,

FOR THE YEAR ENDING THE 30TH JUNE 1906.

No. 495A / V—939.

FROM

W. H. MORELAND, Esq., C.I.E., I.C.S.,
DIRECTOR, DEPARTMENT OF LAND RECORDS AND AGRICULTURE,
UNITED PROVINCES,

To

THE CHIEF SECRETARY TO GOVERNMENT,
UNITED PROVINCES, REVENUE DEPARTMENT,
Dated Lucknow, the 19*th September* 1906.

SIR,

I HAVE the honour to submit the report on the administration of the Department of Agriculture for the year ending 30th June 1906. Hitherto a single administrative report has been submitted, dealing with land records, arboriculture and agriculture; under the orders of the Government of India a separate report will in future be prepared on land records, and the report now submitted follows the arrangement of previous annual reports excluding this subject. The order of contents has not been changed and thus it happens that the subject of arboriculture stands first, a position which its relative importance hardly justifies. The period covered by this report is the year ending 30th June; it thus overlaps to some extent the previous report which dealt with the year ending 30th September.

CHAPTER I.

PREFATORY.

Officers on the staff.

2. I remained in charge of the department throughout the year except for a short period of privilege leave during which Mr. E. A. Molony, I.C.S., officiated. The Deputy Director of Agriculture, the Economic Botanist and the Assistant Director held charge of their respective posts throughout the year, while my Personal Assistant was absent on leave only for a portion of the month of June.

3. No additions to the staff of gazetted officers have been effected during the year; but Mr. E. A. Molony, I.C.S., was placed on special duty for three months in order to complete the studies in well-sinking which have occupied his leisure for some years past. Mr. S. H. Fremantle, I.C.S., was also associated with the department while on special duty in connection with the enquiry into the supply of factory labour.

Tours of officers.

4. My tour during the rains of 1905 has already been dealt with in last year's report and need not be recapitulated. During the first half of the cold weather I marched through the districts of Sitapur, Shahjahanpur and Hardoi, familiarizing myself with the general features of their agriculture, and making a more detailed examination of the sugar-production of Shahjahanpur and Tilhar. I had hoped, while at Sitapur, to select the site for the chief agricultural station which it was proposed to establish there; but I found that no suitable land was available, and I have now chosen an alternative location at Lakhimpur, the next district to the north. In January I went to Pusa to attend the meeting of the Board of Agriculture, and subsequently visited

Partabgarh and Orai in connection with the agriculture stations being established at those places. During my absence on leave, Mr. Molony as officiating Director visited Benares, Mirzapur and Aligarh in connection with his enquiries into well-sinking.

5. The Deputy Director of Agriculture attended the meeting of the Board of Agriculture in January and subsequently visited the Calcutta museum, and other institutions in and near that city. During February he toured in Bundelkhand and managed the cattle-shows in the Banda district. In March he visited parts of the Bombay Presidency to study the collection of Indian cottons at Poona and to gather information regarding the tillage practised and the implements in use with a view to their adaptation to Bundelkhand. He has also visited the agriculture stations at Orai and Aligarh from time to time throughout the year. The rest of the year was spent by him at Cawnpore, in the work of which the details are given in the report of that station, in laying out a small botanical garden for the college, in designing, improving and testing implements, supervising the school and the Veterinary Hospital and attending to the routine work of the station.

6. The Economic Botanist has not yet been relieved of the charge of the Saharanpur botanical gardens, which absorbs practically the whole of his time; he was deputed to lecture at the Forest School at Dehra Dun during the autumn and he attended the meeting of the Board of Agriculture in January. He also visited Cawnpore on one or two occasions in connection with current work.

7. The Assistant Director has again been engaged mainly in connection with sugar-manufacture and seed-distribution. In the rains he advised the authorities of the Rampur State and some Bareilly manufacturers regarding the sugar-factories which they propose to establish. After the rains he was employed continuously on seed collection and distribution until the end of November when he began to arrange for the sugar-demonstrations at the Benares Industrial Exhibition; at the same time he was permitted to assist the committee of the exhibition in arranging their collection of agricultural exhibits, and he was able to supplement the collection materially while refraining from any official share in the actual management. The rest of the year was spent mainly on the routine work of the sugar and seed departments, and in organizing the new agricultural station at Partabgarh, but at the end of May he was deputed to collect a supply of seed-grain for the famine-stricken districts of Jalaun and Hamirpur, an operation which continued till the close of the year.

8. While on special duty Mr. Molony made extensive tours throughout India, visiting Bengal, the Punjab, Madras, Bombay and the Central Provinces to study the local methods of utilising the underground water-supplies. Mr. Fremantle's tours need not be detailed here as they are exhibited in the report of his investigation.

Special features of the year's work.

9. It will be convenient here to indicate briefly the steps that have been taken to carry out the scheme of development of the department. In doing so I follow the order in which the various branches are treated in the scheme.

Local organization.—Of the ten agricultural stations to be eventually provided, Cawnpore was already in existence, Orai came into existence at the beginning of the year, and Partabgarh and Aligarh during its course. It would be premature to establish more than this number of stations until sanction has been accorded to the employment of the additional agricultural officers provided in the scheme.

Well-sinking.—This subject will be dealt with at length in a later chapter. The progress during the year includes (*a*) the beginning of survey of the existing resources of each village in the provinces; (*b*) the preparation of a complete manual of irrigation wells, which is now in the press; (*c*) the selection and manufacture of the most suitable boring-equipment; (*d*), the training of three overseers and 40 borers; and (*e*), the elaboration of a scheme by which the borers will work under the control of district officers and will utilise and supplement the information contained in the survey.

Central research.—Progress in this direction awaits the arrival of an agricultural chemist, and the relief of the Economic Botanist of the charge of the Saharanpur gardens.

Education.—The plans for the college and laboratory have been finally sanctioned; the residences for the Principal, the Chemist and the Botanist are approaching completion; projects for dining-halls for the boarding houses and for laying out the college roads have been administratively sanctioned, and plans for the necessary extension of the boarding-houses are under preparation. Meanwhile the college classes have been started with the current year under the Indian staff and in the school buildings, which will shortly be supplemented by temporary class rooms.

Staff.—As has been noted above no additional gazetted officers have been appointed during the year. Recruitment of the subordinate service has proceeded; at the close of the year it contained 35 officials and this number will shortly be increased considerably. It will not, however, be possible to make rapid progress in this branch until more agricultural officers are at work. In all cases the school or college education requires to be supplemented by a long course of practical training at an agricultural station, and the numbers who can be trained are limited by the amount of time that the agricultural officers can spare. The two officers now on the staff have their hands more than full of work that must be kept going if breaches of continuity are to be avoided, and they can train only a limited number of the raw material at a time. Through the kindness of the Imperial Entomologist, a member of the subordinate service has received a thorough training at Pusa in agricultural entomology, and is now working up the data on this subject available at Cawnpore. Another member will be trained in practical mycology during the current year.

CHAPTER II.

ARBORICULTURE.*

Summary of work done.

10. The monsoon of 1905 was not favourable to planting, and in four districts the failure of the rains interfered with the execution of the working plan. In twelve districts all available funds were diverted from new work to repairing the damage done by the frost. Only 187 miles of road, therefore, were planted with trees as compared with 234 in the previous year. The unfavourable seasons retarded the growth of young trees and the number of miles added to avenues classed as established fell from 238 to 169. Enquiries are still proceeding with a view to the location of unplanted lengths, and pending their completion it is unnecessary to go into this matter in detail. A separate report will be submitted to Government when the enquiries are complete, indicating the districts where expenditure can be increased with advantage.

Working Plans.

11. Working-plans were carried out as a rule, but in 16 districts the causes already mentioned were responsible for divergence. In one case failure was due to the carelessness of a Tahsildar and in two the scheme of work was altered out of caprice.

12. No supervisors of arboriculture were trained at Lucknow during 1906, owing to the absence on leave of the Superintendent of the horticultural gardens. District boards were asked whether they would prefer to have supervisors trained at the Imperial Forest School at Dehra Dun: with one exception the replies were in favour of the Lucknow course, which is more suited to local conditions. Arrangement will be made to open a class at Lucknow in April 1907.

Financial results.

13. The expenditure on arboricultural operations on provincial roads was Rs. 29,042 and the receipts Rs. 36,210. The surplus fell from Rs. 14,564 to Rs. 7,168. The decrease was due mainly to the smaller number of trees cut down, but owing to a poor mango crop the income from fruit was Rs. 2,000 worse than in the previous year.

14. The expenditure on local roads rose by Rs. 10,000 to Rs. 86,056. The receipts, however, fell from Rs. 74,801 to Rs. 65,535 and the operations by district boards involved a net outlay of Rs. 20,521. The receipts under all heads declined, and owing to the poor season the income from grass and fruits was over Rs. 7,000 smaller than in the previous year. The hills districts, Bundelkhand; and the Benares division, showed large deficits; only 13 districts made a profit.

* NOTE.—I am indebted to Mr. C. F. Balfour, Deputy Director of Land Records for the draft of this chapter.

CHAPTER III.

Assistance given to the public.

Distribution of implements.

15. There was a marked increase in the demand for iron ploughs, 229 of which were sold during the year, as against 146 and 142 in the two preceding years. The demand for the most efficient plough, the Watts, showed a normal advance; the lighter Meston plough was locally in rather less demand than last year, but over 80 ploughs of this make were supplied to other parts of India, including Hyderabad, Mysore and the Portuguese possessions. The demand for the other implements supplied by the department was about normal and calls for no remarks. No new implements have been added to the list during the year, but the Deputy Director has devoted much time and care to improving the design of various implements in points of detail so as to increase their efficiency. A mechanic trained at the Victoria Technical Institute in Bombay has recently been put in charge of the workshop to ensure that good materials are used and that work is properly done.

Distribution of seed.

16. Cash sales from Cawnpore amounted in all to 236 maunds of various kinds; this is exclusive of 750 maunds of wheat sent to Egypt for seed, and of 465 maunds sold for cash by other seed depôts. The Cawnpore sales differ from those of the depôts in that a large part of them consists of small lots for trial, while the depôts occasionally supply large quantities of 50 maunds or so to landholders who wish to introduce or extend a particular variety. As mentioned in a previous report, I have had to limit the amount of seed supplied to indentors from other provinces to what is sufficient for experimental purposes; had I supplied all the orders received from Bihar the total issues would have been greatly increased. The demand for particular kinds of seed does not vary greatly: Muzaffarnagar wheat, oats, and Jaunpur maize account for 108 maunds out of the 225 issued from Cawnpore.

17. The seed depôts, of which a list is given in the margin, issued on credit 8,420 maunds of seed for the two harvests of the year. The demand for the *kharif* was not greatly in excess of what might be expected, but in October we found ourselves in a serious position. It will be remembered that the *rabi* harvested in 1905 had been seriously damaged by frost; indeed in South Oudh, where most of the depôts are situated, there was very little seed fit for sowing in the country. Well-to-do cultivators, who ordinarily save their own seed, came to us because they had had nothing fit to save, while the poorer classes demanded seed in enormous quantities. At the same time our stock was very low since much of the produce returned to us in 1905, was inferior and not fit for re-issue. An advance of Rs. 8,000 was obtained from Government, and this, with the ordinary depôt funds, was utilised in importing fresh stocks of seed from the western districts. Even so we were unable to meet the demand, not for want of money, since I have no reason to suppose that a further advance would have been refused, but because we had reached the limits of the capacity of our staff, and I could not undertake to collect more seed in the time available. Apart from the inevitable failure to meet this exceptional demand in full, the depôts have worked satisfactorily during the year, and their value to the people is beyond question.

Departmental seed depôts.
Partabgarh
Amethi-Sultanpur.
Mohanlalganj-Lucknow.
Gonda.
Gursikran-Aligarh.
Meerut.
District Board depôts.
Sultanpur.
Bhadarsa-Fyzabad.

18. As I explained in last year's report, the development of co-operative seed societies is suspended until prices fall to a more reasonable level, as it would be ruinous for the people to lay in their stock of seed at scarcity prices.

19. Apart from the benefits which the depôts have conferred on the people by the provision of pure and sound seed at reasonable rates, the chief result of their organization has been the introduction of Muzaffarnagar wheat into considerable parts of South Oudh where the local strains of wheat are inferior both in productivity and in quality. During the past year arrangements were made with certain cultivators to sow part of a field with the imported wheat and the rest with the local strain under similar conditions, the whole field being

tilled and irrigated as a unit and the only difference between the two portions lying in the kind of seed. Measured parts of the fields were then harvested by experienced members of my staff and the outturns carefully determined; it seems worth while to give the results in some detail. The outturns were as follows:—

No. of experiment.	Outturn in lbs. per acre.		Excess of Muzaffarnagar wheat.	Value of excess at 16 seers per Rupee.
	Muzaffarnagar wheat.	Local.		
I.—*Grain.*				Rs. a.
1	1,020	700	320	9 12
2	860	840	20	0 10
3	1,500	1,200	300	9 6
4	1,220	1,070	150	4 9
5	2,050	1,460	590	18 0
6	1,200	848	352	10 12
7	1,024	768	256	7 13
		Average	284	8 10
II.—*Fodder (Bhusa).*				(at 3 mds. per rupee).
				Rs. a.
1	1,140	980	160	0 10
2	1,940	1,580	360	1 7
3	2,400	2,060	340	1 6
4	2,130	1,960	170	0 11
5	3,300	2,260	1,040	4 3
6	1,904	1,328	576	2 5
7	3,136	2,880	256	1 0
		Average	414	1 7

The average increase per acre in the seven experiments is grain valued at Rs. 8-10-0 and bhusa valued at Rs. 1-7-0, or over Rs. 10 in all. In the lowest case (No. 2) the increase was over Rs. 2 per acre; in No. 4 it was Rs. 5-4-0, in the remainder it was well over Rs. 8. Added to this, it has to be remembered that the Muzaffarnagar wheat fetches a higher price than the local varieties; the difference is usually one seer in the rupee which at normal rates is from two to three annas a maund, and from two to three rupees on a normal outturn. These results are in agreement with those obtained in previous seasons, and after making every conceivable allowance I think it must be concluded that these cultivators would in an ordinary year clear at least eight rupees an acre, and considerably more in years of high prices. In other words, the extra value of the new crop would more than cover the rent of their land. Oudh grows about two million acres of wheat, so that an improvement producing only an extra rupee per acre would be worth 20 lakhs a year to the country.

20. My object in giving these figures in this detail is to bring out the vast possibilities of operations of this kind. I have no doubt that what has been proved to be possible for wheat in Oudh is also possible for many other crops in other parts of the provinces; some of them are less valuable, but others such as sugarcane are more valuable than wheat, and an increased net yield of a rupee an acre on the whole cropped area of the provinces would pay two-thirds of the land revenue. The rate of progress in this direction depends of course on the supply of expert officers, as prolonged series of experiments are necessary in each case before confident recommendations are possible.

Seed for famine-stricken districts.

21. An exceptional feature of the year's work was the supply of seed for the districts of Jalaun and Hamirpur. It was considered by Government to be probable that after the very bad harvest of 1905, the supply of *kharif* seed in these districts, while not perhaps deficient in quantity, would be of very inferior quality and that the outturn of the harvest would be proportionately diminished. With a view therefore to give the people every chance of utilising a favourable season, orders were issued in May that I should organise a supply of sound seed of the varieties required by the people for distribution to them by way of agricultural advances. This onerous duty was entrusted to the Assistant Director who by the end of June had supplied 9,355 maunds of seed to the nine sub-divisions of these districts. The seed was tested for germinating power, and samples of the varieties available were exhibited to meetings of cultivators at each sub-division, who

chose the variety that they wished to sow. The accounts of this extensive transaction are not yet closed and its financial aspect will be reported separately to Government; but sufficient information is available to show that a supply of sound seed was really necessary. Very much of the seed offered to the Assistant Director was found to be old, weevilled, or otherwise unfit for sowing, while the extraordinary rise in the prices of seed-grains which took place when the sowing season was found to be favourable showed the intensity of the demand; in one case *juar* fit for sowing was selling for the time at eight seers the rupee. It is perhaps desirable to point out that these operations are possible only in a famine of limited extent; we were able to get most of the seed required from the surplus available in those parts of Banda and Jhansi where the *kharif* crop had been comparatively successful, but had the crops failed throughout Central India, it would have been impossible to obtain seed of the local varieties in the quantity required.

Improvement of the production of cotton.

22. The work done by the department in connection with cotton may be divided into three branches: (1) the distribution of seed of local varieties, (2) the improvement of the local varieties, and (3) the introduction of acclimatized cotton. The first branch was taken up at the instance of the Government of India; instructions on the subject were received late in the season of 1904-05 and there was not time to buy any considerable quantity of that year's crop, while our purchasers were inexperienced and a considerable proportion of what they brought was barely good enough for issue. There were in fact only about 30 maunds of seed available for issue in 1905. Minute enquiries conducted during that year showed that the existing arrangements for supply of seed give seed which is at least as good as what can be supplied by the department on a large scale, and only two localities were found where there seemed any likelihood of a demand arising for our seed. Adequate stocks were purchased during the year to meet any demand in these areas, but as a matter of fact the demand was very small. About 265 maunds were distributed in Aligarh, but a considerable portion remains on hand; while in the other area, south Cawnpore and Etawah, no distribution at all could be effected. So far I have been unable to find any other localities where seed provided by the department will be taken on any but a retail scale. About 17 maunds were distributed at Cawnpore itself; this is included in the amount of seed shown in a previous section as distributed there.

23. The second branch, the improvement of the local varieties of cotton, is wholly in the stage of preliminary experiment. So far all attempts at crossing our varieties with American cotton have been failures, owing apparently to natural disparity. During the year under report a large area of local varieties was sown at Cawnpore, and some individual plants selected as showing marked improvements. These have now to be propagated to see whether the improvements are reproduced in successive generations. The chances of success in this work cannot be estimated beforehand; there is the possibility of an early fortunate selection, and there is also the possibility that several years may pass without a fortunate selection being made.

24. The most important contribution which Government has made to cotton growers has been the reduction in the charge for irrigating the crop from the canals. The excellent practice of sowing with irrigation before the rains is shown by the returns of the irrigation department to be extending very rapidly*; the loss to Government by the lower rates will very soon be covered by the extended area on which the rates are levied, and the gain to the public will remain

25. Finally as regards the introduction of acclimatized American cottons, it will be remembered that the crop at Cawnpore was almost destroyed by the heavy rains of 1904. There was thus very little seed available for 1905, and most of it was retained for sowing on the farm so as to ensure the supply of as much seed as

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* The following figures extracted from materials that happen to be at hand indicate the rate of progress in this direction :—

		Acres.
Area under cotton irrigated in whole season	1895	45,550
	1900	149,389
Area under cotton irrigated by canals up to 30th June 1905	1905	256,360
	1906	296,950

possible. This year after reserving what was required for the farms at Cawnpore and Aligarh, enough seed was left for about 80 acres, and this has been sown without the offer of any special inducements by cultivators in the Aligarh district; should the crop succeed in their hands it will probably become established in this district which appears particularly suited for its cultivation. It will not of course oust the local varieties but will be grown side by side with them on the better land to such extent as market conditions may render profitable.

26. The acclimatized cotton produced in the year under report was classed by the principal purchaser as "equal to best Broach;" the purchaser at first offered Rs. 22 per standard maund, but on its being pointed out to him that "best Broach" was then selling at Rs. 27, he gave this price willingly. Local cotton was selling at Rs. 22 per maund of 100 lbs., while the price realized for the acclimatized cotton works out to over Rs. 33 for 100 lbs. an increased value of 50 per cent. These facts indicate the necessity of assisting cultivators in their marketing until the crop is established on a commercial scale. At present the bazars do not recognise unginned American cotton as a different article, and no cultivator who sold his produce in this state could have hoped to secure more than two-thirds of its true value.

27. The question is still sometimes asked why an effort is not made to introduce the superior cottons of other parts of India rather than American varieties. The answer is that the former do not pay in these provinces; repeated trials have shown that all the better Indian cottons grown in our soil and climate are much less productive than the local varieties, and the increased price due to quality does not make up for the loss in outturn. The American varieties on the other hand are heavy yielders, giving one year with another as much as the local varieties and selling on last year's figures at a 50 per cent. higher price.

28. It is perhaps well to note here that so far as our experience goes these American cottons *must* be sown with irrigation before the rains if they are to give a satisfactory yield; I have therefore discouraged their growth on anything but the smallest experimental scale in those parts of the country where canal irrigation is not available in the hot weather. Such tracts must, I fear, put up with the local varieties, unless a better cotton should eventually be found with a growing season sufficiently short to enable it to be sown after the rains have begun.

Well sinking.

29. The assistance actually rendered to the public during the year comprises the making of 201 borings, and the supply of advice in 128 cases of difficulty. The falling off in the number of borings as compared with the previous year is due solely to the employment of the staff in experiments and to their withdrawal for training in improved methods of work.

30. The equipment of boring tools hitherto in use was unsatisfactory and made boring an unnecessarily tedious and expensive operation. A considerable part of Mr. Molony's time, both on special duty and as Officiating Director, was devoted to devising an effective equipment with the aid of which borers might work rapidly and without interruption in all ordinary soils and might be prepared for the difficulties that arise from time to time. After exhaustive trials a complete equipment has been devised and the contracts are now being filled; it is hoped that by October the borers will be in possession of the complete sets. Mr. Molony selected Mr. Martin's borer, referred to in previous reports, as the standard tool for all ordinary work north of the Jumna; to this he added improved derricks, lifting-"dogs," and other accessories necessary to prevent loss of time and deterioration of plant, while augurs for clays and sand-pumps for loose strata are also being supplied. A full description of the equipment will be found in the Manual of Irrigation Wells now in the press. At the same time Mr. Molony trained the overseers of the department in the use of these implements, and they in turn have trained a staff of forty borers who will be allocated to districts as soon as the supply of equipment is complete.

31. While these operations were being conducted by the department, a well survey was initiated throughout all districts in the plains, being carried out by the kanungos. When the results of this survey are complete, they will contain lists of

all villages where the masonry wells give an inadequate supply of water, and where the number of wells is insufficient, owing either to the difficulty of finding suitable sites or to the difficulty of raising money. The boring staff will then be placed systematically at the disposal of villages where the wells need deepening or where there are difficulties in locating sites, while it is hoped that a definite policy of *takavi* advances continued over a series of years may do much to meet the financial obstacles that at present deprive the cultivators of water. The results of this survey are of course not complete, though in several districts it has been carried out more expeditiously than I ventured to hope, but as an indication of the scope for the activity of the department it may be mentioned that already more than 10,000 villages in the country north of the Jumna have been found to contain masonry wells that exhaust in less than a full day's work ; probably a very large proportion of these wells can be improved by boring to a lower spring, an operation which is usually both cheap and effective.

32. The present position is then that an organization is practically complete for rendering assistance to all villages in the alluvial tracts both in locating sites for new spring wells and in rendering existing spring wells more efficient. The investigations into the best form of percolation-wells for tracts where spring wells are impossible have made much progress under Mr. Molony's guidance, and I believe we are now near a solution that will be satisfactory in all but the worst sand-beds ; but further experiments are required, and will be carried out this year, before confident recommendations can be made to the public. The other subjects in connection with wells that still await investigation are (*a*) the improvement of the rock wells in Bundelkhand and (*b*) the application to spring wells of power other than the labour of bullocks or of men. Much light has been thrown on the first subject by Mr. Molony's investigations, which will be continued during this cold weather; as regards the use of mechanical power, there is certainly scope for its employment in various parts of the provinces, but there is great initial difficulty in deciding for any given well the maximum discharge compatible with the safety of the structure. This question must be worked out before anything else is done, because an excessive discharge would wreck a spring well in the alluvium, a difficulty that has not to be faced by the owners of the great rock-wells in Madras where some power installations have been used with success. I am at present collecting information with a view to planning an experimental investigation of this problem.

CHAPTER IV.

Supply of information.

Publications.

33. A translation in Urdu of Bulletin No. 20, which deals with the improvement of the supply of drinking water in the Tarai was printed during the year and distributed to land-holders in the north of the provinces. Bulletin No. 21, which deals with the results of acclimatization experiments at the Saharanpur botanical gardens, has been in the press for some time and will, I hope, shortly be published. Bulletin No. 22, the Manual of Irrigation Wells, has also gone to press.

Agricultural Journal.

34. The circulation of the monthly Agricultural Journal published in Urdu under the title *Mufid-ul-Mazarain*, has risen from 788 to 1,024 copies; the increase has occurred mainly in the Muzaffarnagar district, where an association organized by the Hon'ble Rai Nihal Chand Bahadur has subscribed for a large number of copies.

35. A suggestion was made during the year by the committee of the Upper India Chamber of Commerce that a provincial journal should be published in English. This proposal, as well as the development of the vernacular journal and the issue of a Hindi edition, depends mainly on the discovery of a competent editor for the publications of the department. Trained journalists with the necessary knowledge of agriculture are rare in most countries and I have so far been unable to find the right man in these provinces.

36. The number of unofficial correspondents of the department has been as follows :—

Summary of correspondence.

1903-1904	...	1,027
1904-1905	...	1,711
1905-1906	...	2,466

Those familiar with this class of correspondence will realise the increase of labour which it brings to the staff of the department. Much of the increase again related to subjects connected with sugar, but the correspondence covers every branch of agriculture and not a few subjects that can hardly be brought within that term.

CHAPTER V.

Associations, shows and Demonstrations.

37. No meeting of court of wards managers was held during the year. On the whole I think the practice of meeting individual managers when on tour and discussing with them their programmes of agricultural improvement offers greater advantages than frequent meetings at Cawnpore. I have carried out this practice wherever possible during the past year, and have arranged for the Superintendent of the civil veterinary department to meet managers who desired to attempt the improvement of agricultural cattle.

Meetings of court of wards managers.

38. I have not received information regarding the proceedings of the recently formed agricultural association in Muzaffarnagar, or of the older association in Sultanpur. The Porter association of Allahabad has suffered a severe blow by the death of its secretary, Rai Mahabir Prasad Narain Singh Bahadur, who supplied the energy and driving power that such an association needs, and whose death is a distinct loss to the agricultural department. The Bijnor association reports that it has distributed various seeds among its members. No proposals for forming new associations have reached me during the year.

Agricultural associations.

39. Shows were held during the year at Kakora (Budaun), Aligarh, Bulandshahr, Muzaffarnagar, Meerut and Sultanpur. The first four were of the usual type and presented no features of interest; the Sultanpur show was much more of a real success, and I gather from the report that it succeeded, largely through the personal efforts of the Assistant Director, in interesting the people. The department contributed a collection to the Industrial and Agricultural exhibition which this year was held at Benares, and the Assistant Director besides demonstrating the departmental exhibits was permitted to assist the committee in collecting and displaying exhibits from other sources. The chief feature of the department's exhibit was the sugar factory, which will be referred to under a subsequent paragraph.

Agricultural shows.

40. As was mentioned in last year's report, it was decided to hold more and smaller cattle shows in the hope of attracting the real breeders. In the North Oudh breeding-tracts five such shows were held by Major Maxwell, the Superintendent of the civil veterinary department; I have accepted his opinion, which is supported by local officers of experience, that shows can do no good in this tract and none will be held in future. Five shows were arranged in Bundelkhand, but two had to be abandoned owing to famine and cholera; the remaining three were managed by the Deputy Director of Agriculture. The conditions of breeding in this tract differ so widely from those in North Oudh that no argument can be drawn from the one to the other; I am not yet in a position to say whether the Bundelkhand shows are worth holding, but they will be repeated during the current year and until adequate experience has been gained.

Cattle shows.

41. The Meerut farm has been closed as intimated in last year's report. Its last year was disastrous owing to the prolonged drought and the financial results were unsatisfactory. Shaikh Wahid-ud-din, a gentleman of Meerut, who has in the past taken much interest in the farm, came forward with a proposal to work it as a private institution at his own cost. I was glad to accept this public-spirited offer, and have made arrangements by which my local staff will assist the Shaikh for the present.

Meerut demonstration farm.

Private demonstration farms.

42. Kunwar Karan Singh continues his useful and practical work at the Jatau farm in Agra, on the lines indicated in previous reports. The Sultanpur farm has done little owing mainly to the want of irrigation facilities. During the year some landholders in various parts of the provinces have indicated their intention of starting demonstration farms, but these projects are still in the future.

Sugar factory.

43. The sugar factory designed by the Assistant Director was demonstrated at various places during the year; it continued to attract much attention, especially at the Benares exhibition, where it was seen by many distinguished visitors, and—what is more important—a large number of persons engaged in the indutsry. The demonstrations were prolonged at the request of the committee after the rest of the exhibition was over: a very large number of copies of the bulletin describing the factory were sold, (I prohibited free distribution); and an *impromptu* training class was held for students from various places who came forward to learn the methods adopted. In all 25 students, apart from officials of the department were trained during the year. As the result of the demonstrations at Benares and elsewhere, 24 boiling-plants are now being constructed for private purchasers, and it is hoped to supply these in time for the coming season. The great majority of these are being made for residents of other provinces, a fact which indicates the interest taken in the demonstrations at Benares.

44. It will be recollected that the factory is a development of the indigenous *bel*, a set of pans arranged for cleansing and concentrating the juice by a continuous process until it assumes the form of *rab*, which is then passed through a centrifugal hydro-extractor. The arrangement of pans for treatment of the juice has not been modified, while the furnace for heating these has been altered in detail to secure still greater efficiency. The chief progress made during the year has been in connection with driving the hydro-extractors. On a large scale this must, of course, be done by steam, and our experience shows that steam power is cheapest down to quite a small scale; but the bulk of the small manufacturers are opposed to using steam on grounds that are reasonable enough. For them we have produced a cattle gear which can be applied to the machines which we at first worked by hand, and which, though not yet perfected, already gives good results at a greatly reduced expenditure.

45. It may be added that the grade of sugar (technically *khand*) produced by these processes has been found to be particularly suitable for refining to the higher grade known as *bura*, and that this operation is highly profitable.

CHAPTER VI.

Agricultural Education.

The Agricultural School.

46. The agricultural school had a successful year. The increased efficiency of the teaching given by the improved staff was shown in the results of the final examination held in April, when out of 28 students of the second year, 20 passed in the first division which represents a high standard of acquirements. The first year's class, admitted in June 1905, contains 46 students, 30 being kanungo candidates and 16 agriculturists; this number includes six stipendiary students from the Panjab agricultural department. The health, discipline and tone of the school have been satisfactory throughout the year; the various school clubs have been well managed, largely by the students themselves; and the instruction farm, which has been worked with great enthusiasm by the Principal, has been a most valuable addition to the resources of the institution.

47. The school is now in process of development into a college. The class which entered in 1905 will continue the school curriculum, and will pass out in 1907, while the students admitted in 1906, have begun on the college curriculum and will pass out in 1909. The development cannot proceed in one step, and is hampered by the want of the English principal, the chemist and the botanist, the first two of whom have not been appointed, while the third is still detained at Saharanpur by the charge of the botanical gardens.

48. As regards buildings, the final plans of the college and laboratories have been sanctioned by Government. I must express my special obligations to Mr. H. S. Wildeblood and Mr. F. O. Oertel of the public works department for the trouble they have taken in designing this large group of buildings; the interior plans are certainly convenient and the exterior will, in my judgment, be worthy of the importance of the institution. Meanwhile arrangements have been made for temporary accommodation: a vacant bungalow has been assigned to the botanist for laboratory and class-room, temporary class-rooms are being erected for the agricultural classes, and when they are complete the whole of the existing school building will be available for the chemical side. Of other buildings, the three officers' bungalows are approaching completion, and plans for extending the boarding-houses to accommodate 150 students in all are under preparation, while the scheme for providing dining-halls and satisfactory kitchen accommodation for Hindus and Musalmans has just been sanctioned.

Other educational questions.

49. The department has not been concerned with other educational questions during the year. Technical scholarships have been sanctioned to the two applicants who were mentioned in last year's report, one for silk-weaving the other for glass-making. The establishment of new technical classes at the Roorkee Engineering College may also be noted, as I was associated with the enquiries into the need for such classes that preceded their establishment.

CHAPTER VII.

Miscellaneous.

Labour questions.

50. The scheme for a wage census of the provinces was elaborated during the year with the valuable aid of Mr. S. H. Fremantle, I.C.S. Its adoption has been sanctioned and it is being carried out at the time of writing. The deputation of Mr. Fremantle to enquire into the supply of factory labour has been noted in an earlier chapter.

51. No report by the Economic Botanist will be drawn up for the current year. Mr. Leake has made the most of the time available for botanical investigations, but no great progress can be made in these while he remains in charge of the botanical gardens with their heavy work of office and routine.

52. As directed by the Government of India the scheme of experimental work at the various agricultural stations is indicated in the appendix to this report.

53. It only remains for me to acknowledge cordially the services of the officers who have been associated with me during the year, and of my subordinate staff. Work is increasing faster than our means of dealing with it, and there has been no relaxation of the pressure to which I referred last year.

I have the honour to be,

Sir,

Your most obedient servant,

W. H. MORELAND,

Director.

APPENDIX.

This appendix is designed to give a general outline of the schemes of experimental investigations in progress at the various agricultural stations.

Cawnpore.—This is the only station of long standing in the provinces, and from the nature of the case many of the investigations in progress at it deal with the fundamental problems of agriculture and continue for long periods. Among these investigations may be mentioned the continuous growth of particular crops on the same land, with and without manures, determinations of the quantity and composition of drainage water passing through the soil, study of some of the existing rotations of crops, methods of tillage, quantity of water required for various crops, loss of water on the way to the land, and the like. Apart from these standard investigations, most of the work done comes under the heads of study and classification of varieties of crops, and selection with a view to improvement. During the last year the preliminary classification of the wheats of the provinces was completed. Selection is in progress with maize, cotton and poppy, and selection with hybridisation of wheat. It is perhaps well to explain that the term selection is here used in the strict sense, indicating the choice from among a large number of one or more individual plants having marked advantages over the rest, and propagating separately the strains from each chosen individual until it is found that an improved race has been produced.

Jalaun.—The farm at this station was cultivated for the first time during the year ; it is obviously necessary to postpone the introduction of minute experiments until the character of the land has been learned, and the fact that the past year was one of severe drought has been a special hindrance to development. Work already in progress on detached pieces of land has been concentrated at the farm, *viz.*, the trials of rice initiated at the instance of the Irrigation Commission and the search for a wheat suited to Bundelkhand conditions. The destruction of *kans* by flooding is also the subject of investigation; the whole question of tillage of Bundelkhand soils is being studied; attempts are being made to make some use of the inferior soils, and numerous cottons are being grown for selection.

Aligarh.—The farm at this station is being cultivated for the first time during the current year ; its speciality will for the present be cotton.

Partabgarh.—This farm also is now being cultivated for the first time ; sugarcane, maize and rice are the most important crops for study in this locality and they are being taken up.

Reclamation stations.—It is unnecessary to enter into detail regarding the working of the three *usar* stations. We are practically at the end of our programme with almost completely negative results, and I am awaiting suggestions for fresh methods of attack. The only important development during the year was the grant by the railway administrations of low special rates for the carriage of gypsum, which may possibly make it profitable to apply this substance to land that is just over the line of barrenness; a piece of such land is being selected for treatment during the current year. I am not printing a separate report on this work as there are not sufficient materials.

ORDERS OF GOVERNMENT.

No. 3428 OF 1906.

FROM

J. M. HOLMS, ESQ., C.S.I.,

CHIEF SECRETARY TO GOVERNMENT,

UNITED PROVINCES,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

DEPARTMENT OF REVENUE AND AGRICULTURE.

DATED NAINI TAL, THE 19TH OCTOBER 1906.

SIR,

REVENUE DEPT. I AM directed to forward, for the information of the Government of India, the report on the administration of the department of Agriculture in the United Provinces for the year ending the 30th June 1906. This is the first year in which the report on agriculture has been separated from that on land records, and it deals with three months of the year already reported on in the previous combined report.

2. Mr. Moreland gives a clear and interesting description of the work done in many directions, and the Lieutenant Governor desires again to acknowledge his efficient and able administration.

I have the honour to be,

SIR,

Your most obedient servant,

J. M. HOLMS,

Chief Secretary.

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES OF AGRA AND OUDH.

FOR THE YEAR ENDING 30th JUNE 1907.

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1907.

[Prescribed maximum limit of the report, 20 pages.]

TABLE OF CONTENTS.

CHAPTER I.—PREFATORY.

Paras.		*Pages.*
2—3	Officers of the staff	1
4—11	Tours of officers	1—3
12	Special features of the year's work	*ib.*

CHAPTER II.—ARBORICULTURE.

13—14	Summary of work done	3—4
15	Training of supervisors	4
16—17	Financial results	*ib.*

CHAPTER III.—ASSISTANCE GIVEN TO THE PUBLIC.

18—20	Distribution of implements	4—5
21	Distribution of seed	*ib.*
22—24	Seed depôts	*ib.*
25	Seed for famine-stricken districts	6
26—28	Assistance in improving production of cotton	*ib.*
29—35	Well-sinking	6—8

CHAPTER IV.—SUPPLY OF INFORMATION.

36—37	Bulletins	*ib.*
38	Vernacular Agricultural journal	*ib.*
39	Other periodical publications	8—9
40	Correspondence	*ib.*

CHAPTER V.—ASSOCIATIONS, SHOWS AND DEMONSTRATIONS.

41	Court of Wards	*ib.*
42	Agricultural associations	*ib.*
43—44	Agricultural shows	*ib.*
45	Cattle shows	*ib.*
46—47	Private Farms	9—10
48	Sugar demonstrations	10
49	Other demonstrations	10—11
50	Interest of the public	*ib.*

CHAPTER VI.—AGRICULTURAL EDUCATION.

51	The Agricultural school	*ib.*
52—53	The Agricultural College	*ib.*
54	Training of gardeners	*ib.*

CHAPTER VII.—MISCELLANEOUS.

55—56	Industrial questions	12
57	Conclusion	*ib.*

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES

FOR THE YEAR ENDING THE 30TH JUNE 1907.

No. $\frac{526}{V-12A}$.

FROM

W. H. MORELAND, Esq., C.I.E., I.C.S.,
DIRECTOR, DEPARTMENT OF LAND RECORDS AND AGRICULTURE,
UNITED PROVINCES,

To

THE CHIEF SECRETARY TO GOVERNMENT,
UNITED PROVINCES, REVENUE DEPARTMENT.

Dated Lucknow, the 4th September 1907.

SIR,

I HAVE the honour to submit the report on the administration of the Department of Agriculture for the year ending 30th June 1907.

CHAPTER I.

PREFATORY.

Officers of the staff.

2. I remained in charge of the department throughout the year. The Deputy Director of Agriculture, the Economic Botanist and the Assistant Director held charge of their respective posts throughout the year, while my Personal Assistant was absent on leave only for a short period during June. Two additions were made during the year to the gazetted staff of the department. The posts were filled by the Secretary of State; Mr. A. W. Fremantle joined as Principal of the Agricultural College in November, while Mr. G. Clarke, F.I.C., Agricultural Chemist, arrived in February. An additional post of Deputy Director has been sanctioned by the Secretary of State but no appointment has yet been made.

3. Mr. A. C. Chatarji, I.C.S., has been associated with the department since April last while on special duty in connection with the promotion of industries. Perhaps I should mention also the deputation of Mr. S. H. Butler, C.I.E., in connection with technical education as it has been intimated that the resulting charges fall on my budget.

Tours of officers.

4. During the rains of 1906, my journeys were for the most part occasioned by the necessity of studying on the spot the results of the well-survey in order to see how the raw material collected could be made of the most practical use. I therefore visited districts typical of the various parts of the provinces (Partabgarh, Aligarh, Bulandshahr, Saharanpur, Sitapur, Kheri, Bahraich and Gorakhpur), and examined the records in consultation with local officials. The rest of my rains tour was occupied by administrative work at Cawnpore and Lucknow. About a month in October and November was occupied by the survey and records training class; during this period I also visited the Orai and Partabgarh farms. I was in camp in Bundelkhand from the middle of November to Christmas, studying the question of wells both for irrigation and for domestic purposes, and also the existing methods of obtaining seed. January and February were spent in Cawnpore, Lucknow and Allahabad, first in connection with pressing administrative matters and later in arranging and taking part in the Cawnpore meeting of the Board of Agriculture. During March and April, I visited Lucknow, Jalaun, Benares, Sultanpur, Partabgarh, Aligarh, Meerut, Saharanpur, Moradabad and Bareilly, in connection either with well operations or sugar-demonstrations or both. I also attended the un-official Industrial Conference held in Allahabad in April.

5. The Deputy Director of Agriculture remained at head quarters for the greater part of the summer visiting from time to time the Aligarh and Jalaun agricultural stations and other places where his presence was required. During the cold weather he conducted and judged the cattle shows in Bundelkhand visiting Mataundh, Atarra, Karwi, Rajapur and Pailani in the Banda district for this purpose. He also visited some court of wards managers to consult with them on questions of agriculture and agricultural implements, likewise a few landholders and gentlemen interested in agricultural matters, and attended to other points of enquiry at various places especially to the question of cotton, arranging for the distribution of American acclimatized seed and the purchase and disposal of the crop.

6. During the first fortnight of July the Assistant Director was busy in settling the accounts of the supply of *kharif* seeds to the famine-stricken districts of Bundelkhand. From the middle of July to the end of October he was engaged in working out the details of the Partabgarh farm, in distributing *rabi* seeds from the seed depôt, in giving practical demonstrations to cultivators in different districts of South Oudh in improved methods of agriculture, and in conducting sugar experiments. Early in November he was placed on special duty for five months in connection with the Calcutta Industrial Exhibition and with sugar demonstrations in these provinces. During this period he equipped a model factory and demonstrated his processes of sugar-making from the middle of December to middle of January. On his return from Calcutta he attended the agricultural show at Sultanpur and started a school there for giving practical instructions in sugar-making to the students that came to the department from almost all parts of India for special training. The school worked at Sultanpur and trials of newly imported sugar machinery continued there up to the middle of February. During the latter half of February he attended the meetings of the Board of Agriculture at Cawnpore and demonstrated his process of sugar-making there. Early in March the sugar school and model factory were transferred to Amethi where an elaborate demonstration was given at the request of the Raja of Amethi who very kindly provided the necessary raw material and labour. Early in April the Assistant Director attended the Industrial Conference in Allahabad where he read a paper on the revival of the Sugar Industry of the United Provinces. In May he went to Samrauta in the district of Rae Bareli to advise and assist the Raja of Chandapur in starting a demonstration farm. In the first three weeks of June he was engaged in collecting *rabi* seeds, looking after the Partabgarh farm, and arranging for experiments in reclaiming waste lands in South Oudh. In the last week of June he went to Rampur and stayed there till the end of the month to advise the state authorities about the sugar factory which they propose to work in the ensuing sugar season.

7. Shaikh Makbul Husain, B. A., M. R. A. C., officiated as Assistant Director from 5th of November to 31st of March. Besides looking after the Partabgarh farm he inspected during this period the Ghazipur private farm in Lucknow district, the various seed-depôts and usar reserves, and the office at Cawnpore, and visited the cattle fair at Makanpur, the agricultural shows at Sultanpur and Meerut, and gave advice to landholders as required.

8. The officers attached to the college and laboratories are naturally less frequently absent from head quarters than those who are in direct relations with the public. The principal remained continuously at Cawnpore except for a visit to the Aligarh dairy farm, and was fully occupied in organising the classes and in providing the extensions of accommodation rendered necessary by the prospective increase in the number of boarders.

9. The Economic Botanist came to Cawnpore in October on relief of the charge of the Saharanpur public gardens: his time has been largely given to organising the biological side of the college course, while he has visited Saharanpur on departmental business. His investigations have been connected mainly with wheat and cotton: they are not sufficiently advanced for publication. He visited Pusa in June last to confer with the Imperial Economic Botanist on the former crop.

10. The Agricultural Chemist had first to arrange for the temporary teaching and research laboratories and organise the chemical side of the college. He then proceeded to Pusa to acquaint himself with the methods pursued in the laboratories there, returning to Cawnpore towards the end of June.

11. Mr. Chatarji commenced his special duty by visiting the Industrial Conference at Allahabad. He then remained at Lucknow studying the literature that has accumulated on industrial questions, and when this was exhausted he visited Cawnpore, Benares, Meerut, Dehra Dun and Umballa to obtain information regarding particular industries. He also visited the Aligarh district to examine the position of an industrial concern which had applied for assistance from Government.

Special features of the year's work.

12. As was done last year, this paragraph may be conveniently devoted to indicate the progress made in carrying out the scheme of development.

Local organizations.—Four stations were at work during the year : land for the fifth at Atarra in the Banda district has been acquired, and a site for the sixth at Benares has been selected and the notification for its acquisition is being prepared. Benares has been substituted for Jaunpur in consequence of a largely signed petition asking for a station in the former district.

Well-sinking.—This subject is dealt with in detail in Chapter III. The scheme of localization has been worked out and brought into effect during the year, and progress has been made in the experimental work still required for its complete realization.

Control.—The Secretary of State has sanctioned one of the two agricultural officers for whom application was made. This will involve some revision of the arrangements for control, but the matter need not be discussed here as in any case the third officer would have to stay at Cawnpore for some time, and he has not yet been appointed. Meanwhile the distribution of work between the Deputy Director and the Assistant Director has been clearly defined and the latter officer has taken up his residence and established his office at Partabgarh.

Central research.—The Economic Botanist and the Agricultural Chemist are now at Cawnpore. The temporary laboratory for the former is equipped and that for the latter nearly ready.

Education.—The college is now definitely in existence though in temporary quarters. The permanent buildings are in progress; their start was, I understand, delayed by difficulties in settling the contracts but work is now going on steadily.

Staff.—I have not been able to fill all the vacancies on the subordinate executive staff. This has not mattered much hitherto as the agricultural officers are too hard-worked at present to train more than a small number of men at a time. The want of trained men will be felt by and by, but there is really no help for it until the remaining officer arrives and is able to take his share of the work.

CHAPTER II.

Arboriculture.

Summary of work done.

13. The planting season was generally favourable; one district indeed reports that planting was prevented by excessive rain, but there was enough suitable weather if advantage had been taken of it. It is satisfactory to note that there has been none of the rather reckless planting that used to go on in such seasons, and sufficient resources are assured to maintain all the trees planted during the year. The majority of districts have carried out their working plans, but there have been divergencies on provincial roads in six districts and on local roads in eighteen districts. Explanations have not yet reached me in eight out of the twenty-four cases; of the remainder seven represent excess work done in place of planting that was prevented in the previous season of drought, in three there were not enough plants in the nursery, and in six planting was prevented by errors in administration. In one case at least the deficiency in plants was due to the destruction of the nursery by the frost of 1905; and in another (Hamirpur) planting was most wisely postponed until a stock of *mahua* trees should become available. This may be contrasted with Muzaffarnagar where there was a scarcity of suitable trees and a considerable number of *siris* and *kachnar* were planted; in this case it would have been wiser to wait. Apart from this district, the number of unsuitable trees planted was trifling, and I think distinct progress has been made towards planting the best avenue trees which the soil can support.

14. The enquiries into the scope for further planting, which were mentioned in last year's report, proved more tedious than was anticipated; the facts are now almost completely on record and after a final review of them I shall address Government separately regarding the districts where there is need of further funds. These enquiries have naturally brought to light further cases of misclassification, notably in Muttra where over 90 miles of "avenues" have disappeared. For the province as a whole 267 miles have been removed from the list of avenues, while 187 miles of recent planting were classed as established during the year and have been left to themselves.

Training of supervisors.

15. A training class for supervisors was opened at Lucknow and nine students who were sent up by district boards are attending it.

Financial results.

16. The expenditure on provincial roads rose from Rs. 29,042 to Rs. 31,956, as the result of slight increases in various districts. The income on these roads fell from Rs. 36,210 to Rs. 22,237. Receipts from roadside grass which have hitherto been the largest item of income fell to a trifling sum representing the value of thatching grass and either arrears of previous years or current income that was subsequently refunded. I am informed that the sale of grass on these roads has been forbidden by Government, but no orders on the subject have been communicated to me. Half the income came from annual produce and half from timber, most of the latter being from wind-falls as the year was exceptionally stormy in some parts of the provinces.

Expenditure on local roads (Rs. 87,460) is practically the same as in the previous year while the income (Rs. 56,570) has fallen by about Rs. 9,000. Some part of this fall is due to lower receipts from grass, which brought nothing in 15 districts; I am not aware whether the orders referred to above apply to local roads, and I should be glad if their purport can be communicated to me as they probably involve changes in the Manual of Arboriculture.

17. I have thought for some time that the difficulty experienced in planting and maintaining avenues may be due in part to the fact that the *malis* have nothing to hope for beyond escaping punishment for bad work. I have suggested to a few officers the experimental offer of rewards proportioned to the number of trees that reach maturity, and it will be interesting to see whether larger degree of success is attained by this means.

CHAPTER III.

Assistance given to the public.

Distribution of implements.

18. Of the implements most commonly in demand there has been a falling off in the issue of ploughs, following on the exceptional sales to distant parts of India made in the previous year. The demand for chain pumps, chaff-cutters and kibblers is slightly increased, while a new introduction—a hand maize-huller—has excited a good deal of attention at shows and may possibly become popular in those maize tracts where wages are high; its price is Rs. 6-8-0.

19. The Deputy Director has arranged to keep a small stock of implements at a few centres other than agricultural stations, so that they may be more readily available to cultivators; it is too soon yet to say whether these centres will prove useful, but the arrangement is hopeful and is an indication of the way in which I hope each agricultural station will eventually serve as the nucleus of an extending organisation. It is also worth recording that, for the first time in my recollection, some Indian retail firms have applied to be appointed agents for the sale of implements, and I hope it will be possible to develop in this direction also.

20. The Deputy Director's services have been in considerable request for designing implements for use in various provinces; thus he has prepared an iron winnower which takes to pieces for packing, and has supplied specimens to the Punjab, Bombay and Bengal: a large turnwrest plough for Bombay; a five-tined cultivator, expanding and with interchangeable teeth, for Bengal, and a triple-gear chain-pump. There has also been exceptionally heavy work in connection with completing the equipment of boring tools, and the workshop has been more than fully employed. Increased facilities have been provided by the construction of a new large casting-shed, a new cupola, a shed for storing seasoned timber, and some additional machine tools, particularly a lathe for turning screws on long pipes. It is to be regretted that we have still in many cases to make our own stock

implements, but the public demand is not yet sufficiently large to support a factory exclusively devoted to such implements, and the attempts made in the past to get ploughs from engineering firms have proved failures as the patterns were not followed and unsuitable implements were supplied. I need hardly say that I should welcome a chance of handing over to a responsible private undertaking the bulk of this business, which makes very heavy demands on the time of the officer in charge.

Distribution of seed.

21. Cash sales of seed of approved types aggregated 246 maunds of 33 different kinds, an increase of 10 maunds over the previous year; of this 100 maunds consisted of the now well-known Muzaffarnagar wheat which continues to increase in popularity, and 24 maunds consisted of oats. This is an established and extending method of assisting the public, and there is nothing to say about it beyond recording the progress made.

Seed depôts.

22. Issues of seed on credit from the seed depôts increased by nearly 2,000 maunds, to 10,314 maunds: the *rabi* staples, and at their head Muzaffarnagar wheat, continue to increase greatly in popularity, and extension is limited only by the difficulty of providing responsible supervision. As regards finance, the wheat last year was so damaged by the late rains that very little of the produce is fit for sowing, and a good deal of the produce of other grains is also below the standard. It became necessary therefore to take a further temporary advance from Government to renew our stock without waiting to collect our dues. Even so, there has been great difficulty in getting enough good seed for the current year as the quality of the produce in Muzaffarnagar itself was very inferior, and the operation has been very costly. I anticipate that when the temporary advance is repaid in November next the accumulated profits of the depôts will have practically disappeared but that the capital will be intact, and unless there be another really bad wheat-crop, there is no anxiety about the financial position

23. Comparative demonstrations were made as in the previous year of Muzaffarnagar wheat compared with the local strains, the latter supplied by the cultivators who evidently took pains to get the best they could. With country tillage, identical for both crops, the Muzaffarnagar wheat gave an average increased income of Rs. 7-8-0 per acre; with improved ploughs used for both varieties, the increase was Rs. 9-12-0. These results were obtained under the personal supervision in some cases of the Assistant Director and in others of the senior members of his staff, and are in confirmation of those given in the previous report in greater detail. But more important than any statistical evidence is the fact that when cultivators have grown the imported wheat they do not go back to their own variety.

24. I have said above that extension of these operations is limited by the difficulty of supervision. The way in which this difficulty can best be removed is the establishment of co-operative seed societies which after obtaining a stock of good seed shall renew it for themselves from season to season; and I hope to see the cultivators whom we now supply gradually established by these means in a position of independence so that the depôts can move to new centres and repeat the process there. It will of course be a very slow development, but it will be one of fundamental importance to South Oudh, and it is well worth the effort it involves Ten seed societies are now at work: three have arranged to buy their own seed this year, while the remainder are still customers of the depôts, waiting, and no doubt wisely, until they can come in at lower prices. But an important preliminary step has been taken towards the ultimate development of more societies. Most of the seed is now issued not to individual cultivators but to groups voluntarily formed of ten or more members who are jointly and severally responsible for repaying their dues. There are now 208 of these groups in Partabgarh and Sultanpur, and they have paid their dues in bulk and with a sufficient degree of punctuality to justify me in altering the terms of issue in their favour. From October next therefore the interest charged to individuals will be raised in order to induce the remainder to organise themselves in groups. The interest to the groups remains unchanged at 25 per cent., but a rebate of one-fifth of this will be given to groups who pay their dues in full before a fixed date. The immediate value of these groups consists in the reduction of accounts and facilitation of issues and collections; their ultimate, and more important, purpose is to serve as a start for seed-societies holding their own stock.

Seed for famine-stricken districts.

25. An account was given in last year's report of the special arrangements made for the supply of *kharif* seeds in Jalaun and Hamirpur. It may be supplemented by saying that the only expense to Government was the pay of the permanent staff employed in the operations as the rise of prices when a favourable sowing season declared itself was sufficient to cover all incidental expenditure. When I was on tour in Bundelkhand I was at some pains to satisfy myself that the crops yielded by the imported seed had been as good as the local officials reported, and I visited a very large number of harvest-fields and threshing-floors. There is no doubt whatever that the seed was quite good: I found the cultivators, not only refraining from grumbling, but saving the best heads for seed for next year; and I found a distinct amount of dissatisfaction among the richer men, who were known to have seed of their own, at their exclusion from the distribution. It is worth mentioning in this connection that one of the few complaints contained in the agricultural reports from the Bundelkhand districts related to the defective germinating power of gram imported by grain-dealers and sold to the cultivators for seed; this constitutes further evidence of the fact that while the trade can be trusted to feed the people provided they can buy food, it cannot always be trusted to provide seed grain of satisfactory quality.

Assistance in improving production of cotton.

26. The distribution of cotton-seed of the country varieties was unimportant as no localities could be found where the people would consent to take Government seed. This fact is in confirmation of the account given in last year's report of the existing organisation of the supply of seed for this crop; and further confirmation was obtained in my enquiries in Bundelkhand. There every cultivator I met growing cotton had a perfectly clear idea of the seed which he wanted to select; (it is not what the trade wants but is what pays best); and I saw enough selection going on in the fields to show that the idea was not merely theoretical. It is true that high caste cultivators do not select their own seed, but they do nothing they can help, and they make a low caste man do the selection for them just as they get their ploughing done by their inferiors.

27. The improvement of the local cottons is still in the stage of experiment, and there are so far no results of such a definite nature as to justify their record in this report.

28. The distribution of acclimatized American seed of the upland type, which was mentioned in last year's report, gave generally favourable results. Cultivators were cautious and did not sow all the seed they took, a phenomenon with which the early experience of the seed depôts has familiarized me; but they ginned all the produce at home and only asked the department to market the fibre. This fact suggests—it is too soon to be certain—that they have saved the seed for sowing, in which case the future of this crop is most promising. Meanwhile the various agricultural stations have made further issues of 3,500 lbs. of acclimatized cotton, chiefly in the upper and middle doab. The cleaned cotton collected during the year fetched five annas a pound when the local cotton was selling at three annas. A sample of ten bales (4,000 lbs.) of the cotton grown in Aligarh has been sent to a spinning mill for test on a large scale, but the results have not yet been reported.

Well-sinking.

29. The year has been one of transition in this department and the returns of work done are not comparable with those of the previous year. By November last the supply of equipment, very greatly delayed by the various contractors, was sufficiently advanced to justify the posting of borers to the districts where the Collector had asked for their services. Twenty-six districts have now district-borers, one in each, except Aligarh, where work has been found for three men. The system tentatively adopted is that the Collector arranges where the borer shall work, his work being localized as far as possible, while his technical operations are watched by the departmental supervisors. I think this system is going to work. As with most new organisations, a good deal of time was lost at the start, and the borers were slow to realize that their duty was to work as quickly as possible, and not settle down for weeks in a place where comfort awaited them. The worst men have been weeded out, and the majority are now working more satisfactorily.

30. The importance attaching to speed requires a word of explanation. Government provides the tools and pays the borer, while the landholder for whom work is being done is expected to cart the tools, to provide a gang of labourers, and to pay the borer two pice for every foot bored. The carting is not an important item of expense, while the footage-allowance, devised as a stimulant to the borer's activity, is independent of the time taken : the cost to the landholder depends then mainly on the number of days he has to pay the labourers. If he pays full wages rates (which is not probable) his wage-bill will be about two rupees a day. I estimate that, taking one day with another and allowing for interruptions, an average of 20 feet of boring should be done in a day : this works out to 1·6 annas per foot of boring or 2·1 annas including footage. The cost then to the landholder of an experimental boring of 75 feet would be under ten rupees, a sum which will be readily and wisely spent if there is the least doubt about the location of a spring. But if a borer is lazy and does only five feet a day the cost per foot rises to 6·9 annas, and a 75 feet bore would cost between Rs. 30 and Rs. 40, an excessive figure. As I have said progress was at first slow, but in the last quarter of the year the average of all the borers was close on 10 feet daily, which is not altogether unsatisfactory and will almost certainly be below the results for the current year.

31. I think then it may be fairly said that we are on the way to provide boring facilities at a reasonable cost. Meanwhile the results of the well-survey recorded last year are being worked over and tabulated to show the Collector where a borer is most likely to find employment. But they will show much more than this. For districts outside Bundelkhand the final classification of villages is as follows :—

I. Villages with adequate water supply.

II. Villages where the water supply can be made adequate by cheap and easily made earthen wells.

III. Villages which require more or deeper masonry wells—

(a) with engineering obstacles,

(b) with financial obstacles,

(c) with social obstacles.

The classification is not yet sufficiently advanced to indicate the position of any large portion of the provinces, but action is being taken on it as it is completed for each sub-division. Class I requires no action, while in class II action is limited to putting the villages on record in an accessible place, so that in the event of a dry September adequate advances can be given in every such village without delay. At the same time, advances for masonry wells will be given in both classes if they are asked for, but no special offer will be made. The first sub-division of the third class includes the villages (or parts of villages) where the people do not know of the existence of a spring, and the results so far available indicate that there will be ample work for borers for many years. The second sub-division includes the villages where nothing but capital is wanted to ensure adequate protection against drought. With the sanction of the Board of Revenue, I have issued instructions for the initiation of a forward policy in regard to advances in these villages, the offer of advances being made systematically village by village instead of waiting for applications to be received. The third sub-division is the most difficult to deal with, but fortunately the number of villages included in it is very small ; in a few the predominant class has a prejudice against masonry wells, (just as some clans have a prejudice against tiled houses), while in the rest the hostility of the landholders is the real obstacle.

32. In Bundelkhand a rather more detailed classification has been rendered necessary by the extreme depths to water-level and by the nature of the soils. There may be a fine spring within reach, but if the water stands 80 feet below ground as is not uncommon irrigation by the ordinary lifts will not pay. In this tract special attention is being given to the areas that have suffered from water-famines in the hope that it may eventually be found possible to provide every village with one good well tapping the deep springs that almost certainly exist. But before active work is taken up in this line, further experiments are necessary to determine the best methods of boring and pipe sinking in the heavier soils of this tract : these will be initiated during the current year.

33. The other chief subject of study is the construction of percolation-wells. It is established now with practical certainty that perforated cylinders are the best form of such wells, and careful tests have narrowed the field of choice to a few out of the many forms of perforation that are possible. Unfortunately the test of the actual wells built on the lines suggested by theory was hindered by exceptional circumstances. The wells to be tested have to be sunk in sand, and the only suitable locality near Cawnpore is a portion of the Ganges valley. This got cut off from the mainland by a deep and wide channel during last rains and the transport of materials was so much hindered that the wells could not be completed in time for an exhaustive test: this will be carried out in the current year.

34. The problem of the rock-wells of Bundelkhand which I studied during my tour, may be stated as follows. When a new well is sunk it is carried down until either the inflow of water prevents further work, or a rock of such hard texture is found that the tools available will not cut it. In the latter case the well is usually abandoned, and it may be remarked that from the native well-sinker's point of view the metamorphic rocks in this tract vary greatly in texture, something like forty grades being identified by men of experience. In the former case the well serves until a dry year empties it: then the cultivator, if he has money, takes advantage of the drought and deepens the well which is thus permanently improved though not necessarily made completely serviceable. Incidentally it may be remarked that the value of advances for deepening wells should be universally recognized in the rocky country: the advances employ labour and secure a permanent improvement. At the same time it will be clear that it would be a great advantage if means could be offered of deepening the wells without waiting for them to dry up as they would thus be available when the next drought should come. The problem is difficult, for the rocks are so mixed that surface indications and experience in neighbouring wells are not sufficient to show beforehand whether ample water will be found or not; while as diamond-drills cannot be trusted to anyone but a skilled engineer, the rock-cutting tools available make little impression on the harder rocks. Experimental borings are at work round Jhansi, and one or two startling successes have been obtained by short borings, but much further experience is required before a definite offer of assistance can be made.

35. Lastly it may be mentioned that enquiries have been made regarding the possibility of protecting the tracts of deep water-level by tube wells worked by a central plant. The matter has been transferred to the Irrigation department for an examination of the technical questions involved. The impression which I have formed is that such an installation would not be a productive work, but might possibly be justified as a protective measure in certain areas.

CHAPTER IV.

Supply of Information.

Bulletins.

36. Bulletins Nos. 21 and 22 mentioned in last year's report have now been issued by the press. The former deals with acclimatization results at Saharanpur, and the latter is the manual of Irrigation wells. Bulletin No. 23 has also been published: it is the first part of an attempt, which has occupied some of my spare time during the last four years, to correlate the weather with the agricultural statistics with the object of formulating certain statements of probability that will assist in forecasting the agricultural value of the seasons as they come.

37. Enquiries on the sugar industry have become so frequent that it has been found necessary to print a pamphlet giving descriptions of processes and estimates of cost of small plant.

Vernacular Agricultural journal.

38. The agricultural journal has maintained its circulation; the rapid increase of the last few years has, however, been checked. The patronage of the department was extended to a Hindi agricultural paper which was started at Benares but dropped after a few issues, and so far as I am aware there is no privately owned journal in the provinces that makes a speciality of agricultural information.

Other periodical publications.

39. At the instance of the Upper India Chamber of Commerce, monthly agricultural notes are now drawn up for public information and are supplied gratis to the press, as well as to the Chamber.

Arrangements have also been made for the publication of half-yearly bulletins on labour conditions with effect from the current year.

Correspondence.

40. The number of correspondents of the department continues to rise. The figures for the Cawnpore office, (including for comparison those of Partabgarh for the period that the office has been at work there), are :—

1903-4	...	1,027
1904-5	...	1,711
1905-6	...	2,466
1906-7	...	2,712

In addition there are various correspondents whose questions relate to matters of economic importance ; these are usually dealt with by myself and do not appear in the records of the agricultural offices. Judging by the correspondence the reputation of the department for omniscience appears to be fairly established ; one officer indeed was asked for a definitive pronouncement on the origin of life : but the majority of the letters deal with matters in which the information and advice have been found, I hope, of practical value.

CHAPTER V.

Associations, shows and demonstrations.

Court of Wards.

41. No meeting of the managers of Court of Wards estates was held during the year. I have conferred with district officers and managers regarding the programme of improvement in some of the larger estates, and the Deputy Director has met some managers with the same object.

Agricultural Associations.

42. No reports have been received from the Bijnor association or the Porter association of Allahabad. The Sultanpur association held a meeting during the year to discuss the value of Muzaffarnagar wheat, and as a result several talukdars obtained seed-wheat for introduction on their estates. The Jat Kshatriya Sabha, a caste association, inaugurated a new departure by inviting me to depute an agricultural lecturer to their caste meeting at Gurhmuktesar, and I was glad to be able to comply with the request of a body which should be representative of the best cultivators of the Meerut division.

Agricultural shows.

43. Agricultural shows were held during the year at Kakora (Budaun), Parsehri (Sitapur), Sultanpur, Hardoi, Bahraich, Aligarh and Meerut. The agricultural sides of the horse shows at Muzaffarnagar and Bulandshahr have been abandoned by the local authorities with my concurrence. There were no features of special interest at the shows except at Sultanpur where—as always—the sugar factory brought a crowd of spectators from distant places. At the same show Raja Chandra Chur Singh, of Chandapur in Rae Bareli, volunteered a paper on the need of agricultural improvement and of co-operation with the department : it will be seen from a subsequent paragraph that the Raja's interest in the subject is thoroughly practical and I welcome cordially the co-operation of a taluqdar of his position.

44. An agricultural and industrial exhibition was organised by some energetic residents of Chaubepur (Cawnpore district) in connection with the Ram Lila fair. It was purely unofficial but an exhibit of implements, &c. was sent by the department.

Cattle shows.

45. The only cattle shows held were in the Banda district which were managed throughout by the Deputy Director of Agriculture. Mr. Hayman informs me that the shows were more promising than any that have preceded them, and it is possible that in time they may become of definitive value in obtaining recognition of the best class of animals that the country is capable of producing ; they are of course still in the experimental stage.

Private farms.

46. The private farms now on the list of the department as working in consultation with it are as follows :—

(1) Meerut farm, formerly a Government concern, but now belonging to Shaikh Wahiduddin, of Meerut.

(2) Jatau farm in Agra owned by Kunwar Dhianpal Singh.

(3) Sisauli seed-farm, in Muzaffarnagar, belonging to Babu Ram Chandra Gupta, a diplomate of the agricultural school
(4) Kharauli farm in Meerut, owned by Babu Jagannath Prasad, also a diplomate of the agricultural school.
(5) Ghaziabad farm in Meerut, which together with a *swadeshi* weaving factory belongs to M. Ram Chandra Gupta, another diplomate.
(6) Tajpur farm in Bijnor, owned by Kunwar Sheonath Singh.
(7) Samrauta farm, in Rae Bareli, owned by Raja Chandra Chur Singh, talukdar of Chandapur.
(8) Ghazipur farm and school in Lucknow, owned by Chaudhri Muhammad Husain, talukdar.

The objects and the fortunes of these institutions are various. The Meerut farm carries on general agriculture with some stock-breeding in an enlightened way and for the benefit of the neighbours as well as of the owner. The Jatau farm has changed hands by the regretted death of my old friend Kunwar Karan Singh who managed it wisely so as to be a source of benefit to his tenants. I hope his nephew and successor, Kunwar Dhianpal Singh, will follow in his footsteps : this gentleman has recently opened another farm in the Mainpuri district. The Sisauli farm's main object is to provide seed grain for sale : such an industry should be a most valuable institution, and I have been able to put some custom in its way with satisfactory results. The Kharauli farm is an interesting little institution as its owner takes genuine pleasure in seeking for improvements. The Ghaziabad farm is also small : its leading feature is that free teaching in agriculture is given to sons of agriculturists. I have not had recent news of the Tajpur farm, the owner of which is visiting England at the present time. The Samrauta farm is a more ambitious project as the Raja desires to equip it in a thorough fashion for working up the produce as well as harvesting it. I have not yet had an opportunity of visiting this farm but the Raja is in earnest and will, I trust, be successful. The Ghazipur farm too was rather an ambitious project comprising a primary agricultural school. The offer of a member of my staff was made to its owner, but not much has yet been done as there was no capital for farming and no pupils were brought to be taught.

47. It will be understood that the relations of these farms with the department are advisory only. The policy of the farm is directed by its owner, and its execution is entirely in his hands : the department assists with advice and supplies seed, &c. when required. Their value varies greatly, but I regard them as a healthy symptom even if they are not productive of immediate practical benefit.

Sugar demonstrations.

48. It was decided that the processes of sugar-making associated with the name of the Assistant Director should be shown at the Calcutta Exhibition in order to obtain outside criticism ; it was recognized that this course would seriously hamper demonstrations in the provinces, and this proved to be the case. The Calcutta demonstrations were useful and interesting, though the facilities provided by the exhibition authorities proved much less than had been promised, and the inferior accommodation resulted in an exceptional amount of sickness among those members of the staff who were at the exhibition. Later in the year small-scale demonstrations were given at Meerut, Bahraich and a few places outside the provinces, and the processes were also exhibited at the meeting of the Board of Agriculture ; but the chief work of the year was done at Sultanpur and Amethi where a training class was held and enough cane was available for quantitative determinations of yield on a regular working scale. I am particularly indebted to the Raja of Amethi for the facilities which he afforded in this matter. The training class attracted 43 students from all parts of India and it was a striking sight to see young graduates of Madras and Bombay competing eagerly with sons of hereditary sugar-boilers of these provinces in the production of the best and whitest product.

A large programme of demonstrations in the provinces is being arranged for the ensuing year, and it has been necessary to refuse the loan of trained staff to give demonstrations in other provinces, as we have barely sufficient for our own needs.

Other demonstrations.

49. The Assistant Director organised a series of demonstrations in wheat-growing in different parts of Oudh. The results so far as they affect the relative value of Muzaffarnagar

and local wheat have been referred to in the paragraph dealing with seed depôts; the series also included the use of an iron plough against the country plough. The Deputy Director has not reported any local demonstrations carried out during the year in the area under his charge. I regard this kind of demonstration as requiring an even more carefully trained staff than experimental work; and though their development is a necessary feature, it is wiser to postpone it until suitable demonstrators are available than to run the risk of failure through ignorance and inexperience.

Interest of the public.

50. I cannot close this chapter without a short attempt to bring together the facts that suggest the growth of a wider public interest in the operations of the department. I may refer to the increased number of private farms, the growth of correspondence, of requests for personal advice and of ready acceptance of it when tendered; movements such as the request of the Jats for lectures, or the widely-signed petition for an agricultural station in Benares. None of these is by itself a matter of great importance; but viewed collectively, and as symptoms or tendencies, they may indicate the beginnings of a large movement of thought, comparable and probably connected with that towards industrial organisation which has recently forced itself on the public attention. From another side too there are indications of interest in the department being taken by actual cultivators. To take one instance, last August a deputation of cultivators came to the Assistant Director for help in reducing a flood that threatened their rice-crop; pumps were sent out and the water taken off the fields before damage was done. If the indications I have noted do in fact show a general tendency, the development of the Agricultural department was undertaken only just in time.

CHAPTER VI.

AGRICULTURAL EDUCATION.

The Agricultural School.

51. The last class of the agricultural school completed its training during the year under report. The results of the examinations were again highly successful, as all the 46 students passed and half of them were placed in the first division. The result is highly creditable to the Indian teaching staff.

The Agricultural College.

52. Meanwhile the school was being transformed into a college. The students admitted in 1906 are going through the college course which has been organised by the European staff who as already reported joined during the year. The transition is not without its difficulties. I have almost succeeded in completing the recruitment of the Indian staff, and the old buildings have been added to, and temporary alterations are being made, to house the classes until the permanent buildings are ready. The boarding accommodation is being doubled, and by the winter I hope there will be room for all the students who have recently been somewhat crowded: extensions of playing-fields, bathing accommodation and the like are being carried out; a qualified medical officer has been appointed; and the invaluable instruction farm will shortly be supplemented by a dairy. I hope by the end of this year that the social and outdoor organisation of the place will be fairly complete, and the makeshift character of the present buildings is not of very great importance in an institution that relies so much on work in the open air.

53. Special efforts are being made to attract the right class of students for training in the profession of land-agent, a profession which will have to be created. The various landholders' associations have been offered nominations to this class, and I trust that in this way a few suitable students will be obtained.

Training of gardeners.

54. During the year a scheme has been prepared and sanctioned for utilizing the Saharanpur and Lucknow gardens as a technical school of horticulture. It is intended to train two classes, *overseers* and *chaudhris*. The former will be men of English education, often I hope Europeans of Indian domicile, and will be trained as highly as is possible; the latter will be men without more English than is required to read a catalogue of plants, but qualified to take sole charge of the smaller public gardens and of large private gardens. It remains to be seen whether candidates of the right stamp will be forthcoming.

CHAPTER VII.

MISCELLANEOUS.

Industrial questions.

55. The first wage census of the United Provinces was carried out during the year. The results are now in the press. The deputation of Mr. S. H. Butler, C.I.E., in connection with technical education and of Mr. A. C. Chatarji in connection with industrial development have been noted in an earlier chapter : the results of their labours have just been discussed at a conference in which the department will be represented by them as well as by the Agricultural Chemist and myself.

56. The scheme of experimental work at the various agricultural stations is set out in the appendix. This is a convenient place to mention the investigations undertaken into the value of river-silt, a subject which came somewhat prominently before the Board of Agriculture at the Cawnpore meeting. My position in the investigations was that of intermediary between the Imperial Agricultural Chemist and the provincial Irrigation department. Samples of silt were obtained by the latter and analysed by the former ; and after the result had been considered a scheme of enquiry was drawn up to be carried out during the current year.

57. In conclusion I am glad to be able to acknowledge once again the services of the officers who have been associated with me in the department during the year and of my subordinate staff. The agricultural officers have much more than they can do, and the surplus of their work falls to some extent on myself and through me on my Personal Assistant, so that we are eagerly looking forward to the temporary relief that will be afforded by the arrival of the third agricultural officer. The relief will be temporary only because all experience shows that work will increase faster than staff and it will soon be necessary to consider again the question of providing additional officers.

I have the honour to be,

SIR,

Your most obedient servant,

W. H. MORELAND,

Director.

APPENDIX.

Cawnpore.—Only changes in detail have been made in the experimental programme of the Cawnpore agricultural station. The investigations deal mainly with fundamental problems such as the efforts of the continuous growth of crops on the same land with and without manure, the quantity and composition of drainage water, some of the chief existing rotations, and quantity of water required for various crops and loss of water in transit. The remaining work is mainly selection (in the strict sense) applied to maize, poppy and cotton. The new investigations to be taken up include the trial of cotton refuse as manure, methods for preserving potatoes and fruits, and the renewal of the seedstock of potatoes in the hills. An outstation is attached at Juhi for the study of non-alkaline barren land.

Orai.—The main objects of this farm are to study the question of tillage in Bundelkhand, both generally and in relation to the growth of *kans*, to make use of some of the inferior soils, and to attempt to increase the diversification of crops. Permanent experiments have not been laid down.

Aligarh.—This station is intended mainly for the study of cotton, the staple of this part of the country. An outstation is attached at Gursikran for the study of alkali land.

Partabgarh.—This station is still in the preliminary stage. Areas *prima facie* suitable for experiment have been selected on the experience of last year: this year they will be tested in greater detail for uniformity of yield and experiments will then be begun. The special features will be rice and sugarcane. An outstation for the treatment of incipient ravines, and another for the trial of gypsum on slightly alkaline soil, are attached to this station.

ORDERS OF GOVERNMENT.

No. 2941 OF 1907.

FROM

THE HON'BLE MR. J. M. HOLMS, C.S.I.,

CHIEF SECRETARY TO GOVERNMENT,

UNITED PROVINCES,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,

DEPARTMENT OF REVENUE AND AGRICULTURE.

DATED NAINI TAL, THE 18TH OCTOBER 1907.

SIR,

REVENUE DEPT. I AM directed to submit, for the information of the Government of India, the report on the administration of the department of Agriculture in the United Provinces for the year ending the 30th June 1907.

I have the honour to be,

SIR,

Your most obedient servant,

J. M. HOLMS,

Chief Secretary.

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES OF AGRA AND OUDH.

FOR THE YEAR ENDING 30th JUNE 1908.

ALLAHABAD:

Printed by F. Luker, Supdt., Government Press, United Provinces.

1908.

[Prescribed maximum limit of the report, 20 pages.]

TABLE OF CONTENTS.

CHAPTER I.—PREFATORY.

Paras.		*Pages.*
2—4	Officers of the staff	1
5—9	Tours of officers	1—2
10—11	Special feature of the year's work	2—3

CHAPTER II.—ARBORICULTURE.

12—13	Summary of work done	3—4
14	Training of supervisors	4
15—16	Financial results	*ib.*

CHAPTER III.—ASSISTANCE TO THE PUBLIC.

17—19	Distribution of implements	4—5
20	Distribution of seed	5
21—24	Seed depôts	*ib.*
25—27	Improvement in the production of cotton	5—6
28—35	Well sinking	6—7

CHAPTER IV.—SUPPLY OF INFORMATION.

36	Bulletins, &c.	7
37	Vernacular Agricultural Journal	8
38	Correspondence	*ib.*

CHAPTER V.—ASSOCIATIONS, SHOWS AND DEMONSTRATIONS.

39	Official meetings	*ib.*
40—41	Agricultural associations	*ib.*
42	Agricultural shows	*ib.*
43	Cattle shows	*ib.*
44	Private farms	8—9
45—46	Sugar demonstrations	9
47	Demonstration of cane mills	*ib.*

CHAPTER VI.—AGRICULTURAL EDUCATON.

48—51	The Agricultural College	9—10
52	Other Colleges	10
53	Horticultural education	*ib.*
54	Technical classes	*ib.*

CHAPTER VII.—MISCELLANEOUS.

55	Industrial development	10—11
56	Conclusion	11

REPORT ON THE ADMINISTRATION

OF THE

DEPARTMENT OF AGRICULTURE

OF THE

UNITED PROVINCES

FOR THE YEAR ENDING THE 30TH JUNE 1908.

No. $\frac{304}{\text{V}-81\text{A}}$.

FROM

W. H. MORELAND, ESQ., C.I.E., I.C.S.,
DIRECTOR, DEPARTMENT OF LAND RECORDS AND AGRICULTURE,
UNITED PROVINCES,

TO

THE CHIEF SECRETARY TO GOVERNMENT,
UNITED PROVINCES, REVENUE DEPARTMENT.

Dated Lucknow, the 9th September 1908.

SIR,

I HAVE the honour to submit the report on the administration of the Department of Agriculture for the year ending 30th June 1908.

CHAPTER I.

PREFATORY.

Officers of the staff.

2. I remained in charge of the department throughout the year except for the period from 3rd January to 13th March 1908 when I was on privilege leave and Mr. Molony acted for me. The Principal of the Agricultural College, the Economic Botanist, the Agricultural Chemist and my Personal Assistant held charge of their respective posts throughout the year, apart in some cases from short periods of privilege leave. Mr. Hayman held the post of Deputy Director of Agriculture till 21st May 1908 when he left the department on the termination of his engagement and was succeeded by Mr. B. C. Burt who had previously been attached to the department since his arrival in India. The second post of Deputy Director of Agriculture was filled by the appointment of Dr. A. E. Parr, in October 1907. On Mr. Hayman's departure the organisation of the province into circles was put in force, Mr. Burt taking charge of the central, and Dr. Parr of the western circle. The Assistant Director remained in the department throughout the year, but was on special duty in connection with sugar-demonstrations from October to May, during which period Shaikh Makbul Husain, M.R.A.C., officiated in charge of the eastern circle.

3. Mr. A C. Chatarji, I.C.S., has remained attached on special duty to the department in connection with the promotion of industries.

4. Proposals were submitted during the year for the strengthening of the department by the appointment of an Agricultural Engineer, and pending discussion of the permanent arrangements an Assistant Engineer has been lent temporarily by the Irrigation Branch of the Public Works Department and has joined since the close of the year.

Tours of officers.

5. With the expansion of the work of the Agricultural department the Director's monsoon tour is gradually becoming a routine of inspections of the various institutions under his control. During July and August such inspections were made at Benares, Partabgarh, Orai, Agra and Lucknow; while I visited Bareilly and Moradabad in connection with the organisation of sugar-factories, and Allahabad, Jaunpur, Bara Banki, Gorakhpur and Fatehgarh in order to discuss questions of agricultural

importance on the spot. The latter half of August and September were spent at Naini Tal, the Industrial Conference occupying part of the time. In October a further conference on sugar-demonstrations at Bareilly was necessitated by the failure of the cane originally chosen for the purpose, and later in the month I visited Jhansi and Lucknow. The frequent demands on my time in connection with the organisation of famine-relief required that I should remain in close touch with my office, and so rendered a regular winter tour impossible, but during November and December I visited Jalaun, Allahabad, Jhansi, Agra, Partabgarh, Saharanpur, Aligarh, Lucknow and Rae Bareli. Mr. Molony while officiating as Director attended the Veterinary Conference at Calcutta and the meeting of the Board of Agriculture at Pusa. After my return from leave I visited Allahabad, Aligarh, Meerut, Saharanpur, Dehra Dun and Bareilly before proceeding to Naini Tal in the beginning of May.

6. Among the Deputy Directors, Mr. Hayman's journeys during the year were mainly connected with the administration of the agricultural stations at Orai and Aligarh, and with the conduct of agricultural shows at Hardoi and Meerut. In December he visited Naini Tal to select land for the trial of new varieties of potato. Dr. Parr accompanied me on my autumn tour through Allahabad, Partabgarh, Saharanpur and Aligarh in order to gain a general acquaintance with the provinces, and attended the meeting of the Board of Agriculture in February. Since he took charge of the Western Circle he has visited various places in it in order to advise individuals and societies in cases of difficulty. Mr. Burt spent some time at Pusa shortly after his arrival in India, but has not yet had an opportunity of making any extensive tour.

7. The Principal of the Agricultural College and the Economic Botanist made no extensive tours during the year. The Agricultural Chemist attended the Industrial Conference in September, and made a lengthy stay at Partabgarh during the cold weather in order to carry out analyses of the cane crop grown at that station.

8. The Assistant Director was engaged during the rains principally in the management of the seed depôts, and from October to the end of May he travelled almost continuously in connection with the sugar-demonstrations. In June he visited Azamgarh in order to investigate the injury caused to sugarcane by grasshoppers. The Officiating Assistant Director spent part of the cold weather in demonstrating the use of iron cane-mills in parts of the Gorakhpur and Benares divisions where they are not yet known : his other journeys were on matters of ordinary departmental business.

9. During the rains Mr. Chatarji visited the districts of Bara Banki, Fyzabad, Azamgarh and Allahabad, and also Calcutta and Jabalpur in order to inquire into the actual circumstances of the handloom industry. Most of August was occupied by the Industrial Conference, and after its conclusion he was deputed for six weeks to study developments in weaving and other industries at Ahmadnagar in the Deccan, at Madras and other places in South India, and in the Hughli district in Bengal. During the months of February and March, he assisted the local authorities in organising schools at Saharanpur, Moradabad and Tanda (Fyzabad) to popularise the use of improved looms and other weaving appliances. Besides pursuing special inquiries into various matters concerning the industrial development of the province, he spent the rest of the year in touring through the industrial centres with a view to acquire a first-hand knowledge of local conditions. Twenty districts were thus visited during the course of the year. Mr. Chatarji hopes to complete the tour in September and submit his final report by the end of October.

Special feature of the year's work.

10. The progress made in carrying out the scheme of development of the department may be summarized as follows :

Local organisation.—As has been already noted, the division of the provinces into circles for agricultural work was carried out during the year. Only three circles have been formed instead of the four originally proposed as only three officers have been sanctioned for the department. The curtailment of the budget, inevitable in a year of scarcity, made it impossible to stock the

agricultural stations at Atarra and Benares, for which land has been acquired; the land was therefore let to tenants in order to keep it in good condition. Nor has it been possible to provide funds for the purchase of land for the other stations which are still required.

Well-sinking.—The increased demand for well-borers has been the most striking feature of the year's experience. Over fifty borers with four supervisors are now employed, and I am not at all sure that the demand will not increase further.

Central Research.—The temporary laboratories are complete and the officers are gradually training their staff of workers, but most of their time has necessarily been devoted to the organisation of the college courses.

Education.—Students admitted in the years 1906 and 1907 have been following the college course in the temporary accommodation that has been provided. The buildings for the permanent college and laboratories are making progress which is steady if not so rapid as was anticipated when they were begun. The facilities for outdoor instruction and for recreation are now fairly complete, while the hostels are complete except for the dining halls which are under construction.

Staff.—One of the chief problems before me at the present time is to secure for the subordinate agricultural service a position in the eyes of the upper and middle classes comparable with that of the older services of Government. Many promising recruits are debarred from joining by the conservatism of their parents who do not yet realise the possibilities of a career in a department which is rapidly expanding, and recruiting is still a difficult matter. Time however is on the side of the young department, and the wisest policy in my opinion is to recruit slowly but steadily as suitable candidates offer.

11. A few matters outside the scheme of development may be noticed here. That scheme did not take the Himalayan districts into account: but I have since been able to ascertain something of their needs and their capacities, and a scheme has been settled which aims at the development of the lower hills as the market-garden and orchard of the plains. A central station for this work has been acquired at Douglasdale near Naini Tal, and preliminary operations have started with the trial of a large number of new strains of potato. The foundations of a school of horticulture were laid during the year as will be explained in Chapter VI; and a scheme has been arranged for an enterprise in sheep-breeding and poultry-breeding to be carried out in the Rampur State with the assistance of the Local Government.

CHAPTER II.

Arboriculture.

Summary of work done.

12. The planting season was highly unfavourable throughout the provinces, and the prevailing conditions reacted in most districts on arboriculture. The mileage planted contracted from the 244 miles contemplated by the working plans to an actual length of 182 miles, and in some districts expenditure has been profitably diverted from new planting to the preservation of young plants from the disastrous effects of drought. Divergencies from the working plans have occurred in seven districts on provincial roads, and in twenty-six districts on local roads. Drought was the main factor in producing this result, but in a few cases special causes were operative. In two districts the plans were found unsuitable, while in four funds were diverted to the nursing of young trees or the filling of gaps. In Basti a double amount of planting was done in one tahsil, and in Sitapur planting was, with my concurrence, abandoned to enable the district to consolidate its financial position. In one district planting was prevented by defective administration. Increased attention has certainly been given to the selection of suitable trees: only in one district were a few unsuitable trees planted on local roads, and these will be replaced by fruit trees during the rains. This last result may be viewed with satisfaction: a few years ago the planting of unsuitable trees was a very common defect in many districts.

13. A report dealing with the results of an enquiry made by this department into the possibilities of further roadside planting was submitted to Government during last October. A further enquiry has since been ordered on some points, and on its completion a separate report will be submitted. Further cases of "paper" avenues have come to light, notably on the local roads of the Bareilly and Pilibhit districts, where 108 and 57 miles have been struck off. For the provinces as a whole, 357 miles, misclassified as avenues, have disappeared from the list; while 324 miles of recent planting have been classed as "established," that is, as requiring no further protection.

Training of supervisors.

14. A training class for supervisors has been opened this year at the Government Horticultural gardens in Lucknow, and is being attended by ten students sent to it by district boards.

Financial results.

15. Expenditure on provincial roads rose from Rs. 31,956 to Rs. 34,867; the increase is mainly due to the enhanced cost of protection imposed by drought conditions. Receipts have fallen from Rs. 22,237 to Rs. 20,760, the loss being due in the main to the prohibition of grazing leases, and in a less degree to the natural contraction of income from windfalls. The net cost to Government was Rs. 14,107 as against Rs. 9,719 in 1906-07. The ratio of expenditure to work done varies greatly with different districts, but expenditure seems, on the whole, to have been well regulated.

16. Expenditure on local roads rose from Rs. 87,460 to Rs. 96,879 and receipts fell from Rs. 56,570 to Rs. 49,852, the deficit being Rs. 47,027, as against Rs. 30,890 in the preceding year. Expenditure exceeded income in all districts except Bijnor, Muzaffarnagar, Etawah, Pilibhit, Benares, Mirzapur and Fyzabad. The general decline in income is due—apart from the natural effect of the drought on the fruit crop, and the restricted market for wood—to the introduction of free grazing on all roads under the management of the Public Works Department. In this connection I may quote the remark of the Executive Engineer of the Meerut Division, who refers to "the enormous damage done to arboricultural operations by road-side grazing."

CHAPTER III.

Assistance to the public.

Distribution of implements.

17. The chief feature of the year in connection with implements has been the rapid increase in the demand for chain pumps for lifting water from canal distributaries. Sixty-four of these were sold and 55 were on hire during the year; and it is a striking fact that the most urgent demand came from the Jalaun district, a tract not usually regarded as enterprising; the explanation is to be found in the short supply of canal-water, which rendered it necessary to irrigate as quickly as possible, speed being the great merit of these pumps. There is now no reasonable doubt that great public benefit will result if these pumps are placed within reach of the cultivators on canals; a large organisation both for manufacture and for distribution is necessary to secure this object, and it seems advisable to make use of the existing organisation of the Irrigation department rather than create a new department. I have therefore arranged with the approval of Government to transfer a portion of my stock of pumps to the Irrigation Department, who will let them out during the coming year, and if the experiment proves successful there will be no difficulty in its rapid extension as the canal foundry will be able to turn out the pumps in much greater numbers than is possible at my small workshop.

18. Apart from chain pumps the most popular implement has been the new maize-huller designed by Mr. Hayman, the late Deputy Director and described by him in *The Agricultural Journal of India* for April 1908. The price of this ingenious implement varies from twelve annas to Re. 1-4, so that it is within the reach of most cultivators: 67 were sold during the year. The demand for other implements shows no feature of interest.

19. Experience is bringing out clearly the need of local depôts to place implements within the reach of the people: in a country which has never had a large supply of metals, iron implements are novelties and intending purchasers need to see them at work and to have some place near at hand to refer to when anything goes wrong. Implement centres are being established gradually where responsible persons can be found willing to undertake their supervision, and it may be pointed out that in this way a method of doing direct and practical good is placed at the disposal of landholders and agricultural associations.

Distribution of seed.

20. Cash sales of seed have been on about the usual scale, the principal development being in the acclimatized American cotton, which cultivators are now anxious to try, and which will establish itself on a scale adequate to the needs of the provinces if fair prices can be obtained. The subject is referred to at greater length in a subsequent paragraph.

Seed Depôts.

21. Issues of seed on credit from the seed depôts again exceeded ten thousand maunds, which is about the largest quantity that can be handled consistent with proper supervision. The *kharif* crops failed very widely, and it has been necessary to remit the interest due on this crop and to give time for repayment of the principal. The demand for *rabi* seed was intense, and was met as far as possible by replenishing stocks from the western districts. The *rabi* cereals were successful but the pulses were poor; strict collections were enforced in the case of this crop, but barley was accepted in place of gram and peas, where cultivators were unable to return the latter crops.

22. My audit of the financial positions of the depôts will not be completed in time for notice in this report: but it may be mentioned that in view of the necessities of the people I have bought large quantities of sound seed at famine-prices, and the accumulated surplus of the depôt will have disappeared and probably a deficit come into existence when the new stock is written down to normal rates. I do not apprehend that the deficit will be more than can be made good out of profits assuming a few fairly normal seasons.

23. The organisation of co-operative seed societies continues in abeyance until a start can be made with fairly cheap seed. Meanwhile the substitution of groups for individual customers has made considerable progress, accelerated by the differentiation in the rate of interest in favour of the former: the rebate promised for punctual repayment for groups has not as a rule been earned, a fact which is not surprising in view of the circumstances of the year; but it will be a valuable incentive to punctuality when favourable seasons return.

24. Extension of these operations depends on the formation of co-operative societies which will gradually set free my staff for work in new areas. Small extensions have, however, been made during the past year at Kadipur in Sultanpur, and in the Jaunpur district; the latter is financed by the Court of Wards and one of its principal objects is the maintenance of a sound supply of the well known maize of the district.

Improvement in the production of cotton.

25. I have explained in previous reports that as a rule there is no prospect of advantage in interfering with the supply of seed of country cotton. The area occupied by this crop has extended considerably in the last few years, partly owing to the reduction in irrigation-rates, and partly owing to the development of some districts north of the Ganges, (mainly Unao, Hardoi and Budaun), which are intermediate between the recognised cotton zone on the south and the rice and sugarcane zone on the north. No opportunity was found of assisting the people with seed for the 1907 crop; it was however ascertained that as a result of the scarcity there would be some difficulty in supplying portions of Bundelkhand for the 1908 crop, and seed was purchased for distribution in these localities.

26. The experiments directed towards the improvement of the quality of the indigenous crop are now for the most part concentrated in the hands of the Economic Botanist: they are still in the stages of preliminary study, hybridisation and selection of individuals, but some of the earliest selections are now being grown on a larger scale with a view to field trials.

27. The acclimatized American cottons were grown successfully during the past season by many cultivators mainly in Aligarh, and the demand for seed for the 1908 crop has been greatly increased. All available seed has been taken up, and I understand that in many cases cultivators have supplied their neighbours without the intervention of the department. It is thus anticipated that the quantity of this cotton produced this year will for the first time be sufficient to offer to the market on a commercial scale and it will depend entirely on the prices consumers are willing to pay whether this crop shall be added to the permanent resources of the provinces.

Well sinking.

28. The conditions of the year have proved unfavourable to the rapid completion of the well-survey, the object of which is, it will be remembered, to ascertain with general accuracy the localities where more masonry wells are needed, and the nature of the obstacles which have hitherto prevented their construction. The data obtained from the subordinate revenue officials have to be scrutinised by an officer of the Collector's staff before they can be used for this purpose, and the pressure caused by the famine has made it impossible in many districts to find time for this necessary but laborious operation. Sufficient data have however reached me to justify a few tentative conclusions on a matter that lies at the root of the agricultural prosperity of these provinces. The first conclusion that stands out is that the demand for more wells is for practical purposes unlimited, and that it tends rather to increase with fresh facilities, because the standard of a satisfactory supply varies widely with the locality, and increased construction tends to raise the standard itself. For instance there is no doubt that parts of Unao have an inadequate supply of wells compared with the standard of Rae Bareli; yet the people of Rae Bareli ask for far more wells than those of Unao, because the latter have not yet realized what is possible, and go on making the best of unirrigated rabi crops on land that is quite fit for irrigation. The second conclusion is that what may be termed 'social' obstacles to construction—inertia, hostility of landholders and the like—are relatively unimportant and will in many cases yield if the determination of Government that the people must be protected against drought is brought home with sufficient clearness. Thirdly, it is established that difficulties of an engineering nature, either in remedying the inefficiency of existing wells or in locating suitable sites for new construction, exist on a scale that fully justifies the assistance now being offered by the department; but, fourthly, there is no doubt that lack of capital is by far the greatest obstacle to complete protection.

29. The provision of capital lies outside the scope of my department, but a note on the subject has been submitted separately to Government. In order to cope with engineering difficulties, I have now five subordinates whose duty it is to supervise the men engaged in boring and also to advise the public in all cases of difficulty. Their advice is undoubtedly appreciated if one may judge by the increasing demand for it, but its value can hardly be detailed in this report as it is the sum of a large number of items of very varying importance; sometimes a well is found merely to need cleaning, while at other times the entire loss of a well can be prevented by a few simple measures. The fact that is most strongly impressed on me by the study of these cases is the extraordinary rashness with which wells are sometimes started: people commonly come for advice when they have sunk an expensive cylinder thirty or forty feet and do not know what to do next; but it is scarcely necessary to add that this rashness is displayed by landholders and philanthropists, and not in my experience by practical cultivators.

30. For the actual work of boring 53 men were employed at the close of the year, the great majority under the orders of district officers. Their duties fall under two heads, sinking pipes in inefficient wells to tap a deeper spring, and furnishing information regarding sites where wells are proposed. Under the first head, 690 wells were bored during the year and the well was substantially improved in 441 cases (64 per cent.); the failures are due to a deeper spring not being found within the depth to which the owner of the wells was willing to experiment. The data available indicate that this process is much more likely to be successful in the east than in the west: of districts where it was employed on a large scale, Benares, Jaunpur, Unao, Rae Bareli, Sultanpur and Bara Banki

stand out with success in 75 to 80 per cent. of the trials, while in Aligarh the percentage is only 48. The worst results were unfortunately in Banda where three borers were sent in the spring to see if any help could be given in view of the impending water-famine : the effort was a practical failure as there are as a rule no springs within reach in this part of the country.

31. In testing sites proposed for new wells the measure of a borer's usefulness to the people is largely the number of sites shown to be unsuitable : out of 335 sites tested during the year 117 (or 35 per cent.) were found to be useless, and had wells been made on them the amount of money wasted would have gone far to pay the whole cost of the boring establishment for the year. In this case too the eastern districts are more fortunate than the west : in the Meerût division one site out of two was found unsuitable, while in Lucknow only one was unsuitable out of ten.

32. I explained in last year's report that the speed attained in boring is a most important factor in reducing the cost to the employer, who pays the labourers by the day : the experience of the past year has shown that apart from this fact, speed is an important item in success, as when difficult strata such as quicksands are met with the best chance is to go through them without allowing time for the pipes to be caught or jammed. From this point of view the year has marked a great advance as the average daily speed of all borers (practised and inexperienced together) has been steadily rising, and in the last quarter amounted to 20 feet daily as against $8\frac{3}{4}$ feet in the corresponding period of 1907. We are now therefore within sight of the goal at which I have aimed, that the boring of a well should be finished in one working day in all cases where complications do not arise.

33. The total amount of work, as distinct from the speed at which it is done, is however still much below what is possible. Much delay has resulted in many districts from employers keeping a borer idle by failing to supply carts or labour, while in a smaller number of cases the tahsildars have failed to make timely arrangements for their continuous employment. The delays from the first cause are so serious that in the revised rules which I am preparing I am providing for a charge for demurrage on the tools for days when they are kept idle. The other causes of delay will I expect diminish in importance as the system of work becomes reduced to routine.

34. Increasing popularity of boring is also a material factor in saving time as applicants compete for the next chance and are afraid to lose their turn. Such competition is increasing ; and another satisfactory feature is the tendency of the larger landholders to purchase tools and have their own staff trained in their use—arrangements have been completed or are in progress to supply tools to the Awa, Jahangirabad, Simri, Chandapur and a few other estates.

35. The experimental work of the department on percolation-wells is now being brought to a conclusion by the Engineer who has been lent by the Public Works Department, and need not be discussed at present. No progress has yet been made towards securing an efficient outfit of rock-boring tools that can be worked safely by men of moderate skill ; and in this section the only important development of the year has been the employment in the Jhansi district of an expert blaster whose services are available to cultivators on payment of a fee. He has found ample work and secured valuable results in the rock-wells of the Jhansi district.

CHAPTER IV.

Supply of Information.

Bulletins, etc.

36. No bulletins were published by the department during the year. The Agricultural Chemist has drawn up a detailed note on his analytical work during the past sugar-season, which is being published by the Imperial Agricultural Department. The publication of monthly agricultural notes and half-yearly labour reports has been continued.

37. The circulation of the vernacular agricultural journal has remained practically unchanged. It is very difficult to find a competent editor, and the paper is not yet what it should be: the development of an edition printed in the Nagri character must wait until satisfactery provision has been made for the editing. The journal is now supplemented by notes on the progress of co-operation which are kindly supplied by the Registrar.

Vernacular Agricultural Journal.

38. The number of correspondents of the department has again risen sharply and amounted to 3468 as compared with 2712 in the previous year: four years ago the number was 1,027. Sugar-manufacture and well-sinking are perhahps the commonest subjects in a correspondence of very extensive range; the Assistant Director alone corresponded with nearly 250 firms and individuals regarding his processes of sugar-manufacture.

Correspondence.

CHAPTER V.

Associations, Shows and Demonstrations.

39. No meetings of the officers of the Court of Wards or other departments were organised during the year, which owing to the famine has been one of extreme pressure on all departments.

Official Meetings.

40. A report has reached me from the Bijnor Association, which shows that the members are looking for a suitable piece of land for experiments. Pending the result of their search, little has been done beyond supplying vegetable seeds to the members and importing some seed-canes from Dehra Dun for trial by cultivators. The Porter Association of Allahabad reports renewed activity under the stimulus of its enthusiastic General Secretary, K. Ragho Prasad Narain Singh: seed-potatoes and seed-wheat have been imported, and bulls maintained for cattle breeding by the association generally, while the Secretary has sunk fifty masonry wells on his estate and has installed a sugar-factory. The improvement of agriculture would be a much simpler matter than it is if such enlightened and beneficent gentlemen as the Kunwar Sahib were generally to be found.

Agricultural Associations.

41. There is at the present time a movement towards the formation of district agricultural associations: definite progress has been made in Mainpuri and Bareilly, while something is being done in Bulandshahr and Budaun. It is therefore desirable that I should explain that no stimulus to the formation of an association is given by officers of the department, but that when an association is formed they do their best to put it in the way of doing practical good, while abstaining from interference with its actual management.

42. The year was unfavourable for the organisation of agricultural shows and only four were held, at Kakora (in Budaun), Hardoi, Aligarh and Meerut: these presented no special features of interest.

Agricultural shows.

43. The scarcity of fodder made it necessary to abandon the cattle shows which it was intended to hold in the Banda district. These shows have some promise of life in them and I hope they will be resumed during the current year.

Cattle shows.

44. In last year's report I gave a list of eight private farms of different types which were being worked in consultation with the department. Two of these have dropped out from the list, while a new farm has been opened at Phariha in the Mainpuri district by K. Kushal Pal Singh. The value of these farms is of course very unequal: one or two I fear exist on paper only, a few are kept up for amusement, and a few with some more definite object. The Jatau farm, the oldest, makes a point of supplying improved seed to the cultivators, and its example will be followed by the newest farm, that at Phariha, where Kunwar Kushal Pal Singh is displaying his many-sided activity. The most extensive project among these farms is the Raja of Chandapur's enterprise at Simrauta in Rae Bareli. He has a considerable area of land worked on thoroughly efficient lines, and I am informed

Private farms.

that monthly discussions take place on it among the leading cultivators of the neighbourhood, and that in some cases they are already beginning to follow the practice of the farm. It is a noteworthy fact that the raja is himself setting an example of growing sugar-cane, a practice which is opposed to the prejudices of the higher castes in the neighbourhood.

Sugar demonstrations.

45. Arrangements were made for a very extensive series of demonstrations of the Assistant Director's methods of sugar manufacture; and though the original arrangements were seriously upset by the failure of the cane-crop which had been secured as raw material, it was found possible to do much useful work. A full account of these demonstrations will be published elsewhere; its preparation has been delayed by the fact that the owners of some factories decided to hold their stock of sugar in view of an expected rise in prices. It is not therefore possible at the time of writing to state the exact profits made, but they vary according to circumstances between 10 and 60 per cent. on the working capital after allowing interest and depreciation on the fixed capital employed.

46. The most important of the demonstrations was that held at Panchli near Meerut where Shaikh Wahid-ud-din generously placed buildings at our disposal for a sugar-school in connection with the demonstration. There were considerable difficulties in getting enough sugarcane but they were overcome with the cordial assistance of Mr. Porter, the Collector, and S. Saghir Husain, the Tahsildar, and all students were trained sufficiently. A more extensive progamme of demonstrations is being prepared for the current season.

Demonstration of cane mills.

47. It will be recollected that at the Naini Tal Industrial Conference some members pressed for demonstrations of iron cane mills in those parts of the country which still use stone or wooden mortars for extracting juice. Demonstrations were accordingly arranged in Jaunpur, Azamgarh and Gorakhpur, and carried out under the supervision of the officiating Assistant Director. In the first two districts the superiority of the iron mills was recognised by the people and the leading cane-mill owner of the provinces has agreed to establish hiring-depôts in those districts, much the most effective method of popularising the mills. In Gorakhpur the peculiar form of wooden mill there used was found to give a much higher percentage of juice than other indigenous implements: indeed it fully held its own against the iron mill in respect of quantity of juice though much inferior in point of time; and it is doubtful whether the incidental advantages of the iron mills are sufficient to enable them to supersede these particular wooden mills. Further trials will I hope be made next cold weather to settle this point definitely.

CHAPTER VI.

Agricultural Education.

The Agricultural College.

48. The agricultural school ceased to exist when the class of students recruited in 1905 passed out in the spring of 1907. The classes recruited in 1906 and 1907 have been throughout following the college course, and when the 1908 class is made up the college will be practically at its full numerical strength. No class passed out during the year.

49. As regards recruiting, the present indications are that we shall be able to pick and choose. The competition for nomination as supervisor kanungo is extraordinarily keen, and it would be quite possible to fill the college with most suitable students chosen from these nominees alone did the prospect of vacancies in the revenue line justify recruitment on this scale. For students other than kanungo-candidates, a good class of candidates is also offering, but I was disappointed that last year none of the landholders' associations took advantage of my offer to receive their nominees for training as land-agents: a few nominations have however been received for the 1908 class, notably one from the Maharaja of Balrampur, and I trust that as time goes on the college will look to the larger landholders for a fair share of its recruits.

50. The permanent buildings of the college and laboratories are progressing: the hostel accommodation is practically complete, the dining halls and kitchens are under construction, and sanitary arrangements on modern lines will I hope soon be installed. The model dairy is at work, and there are adequate facilities for outdoor instruction and for recreation. The Indian instructional staff is almost at full strength and the time of the officers—the Principal, the Economic Botanist and the Agricultural Chemist—has been devoted largely to the detailed organisation of the courses of instruction.

51. A residential agricultural college in this country must be much more than an institution where technical instruction can be obtained, and I do not think it is going too far to assert that the collegiate side is in the initial stages more important than the agricultural; that is to say, the most pressing problem just now is to create a social organism with a healthy life and tone. It is not a problem that can be solved off-hand, but I think I may fairly say that the college has started on the right lines, and that it promises to supply the class of diplomates that is wanted, gentlemen with minds trained in the agricultural sciences, with a practical knowledge of the needs of the cultivator, and accustomed to rely on their eyes and ears rather than on what is found in books.

Other colleges.

52. At the request of the authorities of the Muhammadan Anglo-Oriental College, the land of the Aligarh agricultural station has been made available for instruction and is visited occasionally by about 30 students of the college who are interested in agriculture. I have also permitted a member of the Aligarh staff to give occasional lessons in practical horticulture at the college itself. I have been in correspondence with the Principal of the Colvin Talukdars School regarding the agricultural classes which it is proposed to establish there, and if the proposal is carried out I trust that the school will come into close relations with the agricultural college to the advantage of both institutions.

Horticultural Education.

53. A beginning has been made during the year on a scheme of horticultural education which will I trust develop from its present modest scope into a movement of real value to the country. No observer can fail to be struck by the growing taste of the upper and middle classes for public gardens as well as for private gardens and orchards, more productive and more attractive than the indigenous *bagicha*. This taste has created a demand for classes of gardeners intermediate between the Kew-trained Superintendent and the practical gardener (*mali*) whose practical skill is limited by the want of early training; and in order to meet this demand training-classes have been opened for overseers and for head-gardeners (or *chaudhris*). The overseers are at present mainly required for the public gardens which are steadily increasing in number and importance, and general sanction has been given to the formation of an overseer service when qualified men are available. My enquiries have shown that in addition to diplomates of the agricultural college a very suitable class of youths can be obtained from the European schools in the provinces: two of these are now working as apprentices at Saharanpur and it is proposed to take a similar number of apprentices annually in future until the gardens are adequately staffed. For the other class, head gardeners, excellent material has been found at Saharanpur, while suitable candidates were not at first forthcoming in Lucknow, the other centre selected for the training of this class. The arrangements are, it is unnecessary to say, still in the experimental stage, but so much is clear that there is a distinct opening for a new profession and a new occupation in the directions I have indicated, and as experience is gained I have little doubt that our public gardens can be made to afford the requisite training.

Technical classes.

54. To complete this chapter it is perhaps desirable to refer again to the training-class for arboricultural overseers which is being held at Lucknow, and to the school of sugar-manufacture held by the Assistant Director during the past sugar-season.

CHAPTER VII.

Miscellaneous.

Industrial development.

55. The question of industrial development has been prominently before Government and the public during the past year, and pending the organisation of an Industries Department some share of the work involved has necessarily fallen on my staff and

myself. The Industrial Conference at Naini Tal was attended by the Agricultural Chemist and myself as well as by Mr. Chatarji, and the former has recently been engaged in designing some of the laboratories for the proposed Technological Institute. Mr. Chatarji's activities have been recorded in an earlier chapter : my own duties have consisted in supplying information, mainly regarding raw materials, both to Government and to the public.

Conclusion.

56. I may fitly close this report by recording my acknowledgments to many members of the public, to other departments, and to my own staff. To the public I am indebted for the supply of a large portion of the information received on which the department acts ; and the co-operation of the large body of regular reporters on crop-prospects, and apart from them of my occasional correspondents, is valued very highly. It has been my aim to keep the department in touch as closely as possible with District Officers, and with departments such as the Irrigation, the Co-operative Credit Societies, and the Court of Wards, which are intimately connected with the agricultural economy of the country, and I have to acknowledge the cordial relations that now exist and the assistance I have received from many officers. Finally, as regards my staff I would again acknowledge the assistance I have received from the officers and from the executive and clerical services of the department.

I have the honour to be,

SIR,

Your most obedient servant,

W. H. MORELAND,

Director.

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES OF AGRA AND OUDH.

FOR THE YEAR ENDING 30th JUNE 1909.

ALLAHABAD:

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TABLE OF CONTENTS.

CHAPTER I.—PREFATORY.

Paras.		*Pages.*
2—3	Officers of the staff	1
4—9	Tours of officers	1—2
10—12	Special features of the year's work	2

CHAPTER II.—ARBORICULTURE.

13	Summary of work done	3
14	Extension of avenues	*ib.*
15	Training class for supervisors	*ib.*
16—17	Financial results	*ib.*

CHAPTER III.—ASSISTANCE TO PUBLIC.

18—24	Distribution of implements	3—4
25	Distribution of seed	4
26—27	American cotton	4—5
28—30	Seed-dépôts	5
31—38	Well-sinking	5—7
39	Poultry	7
40	Extirpation of grass-hoppers	*ib.*

CHAPTER IV.—SUPPLY OF INFORMATION.

41—43	Publications	7—8
44—45	Vernacular Journals	8
46	Correspondence	*ib.*

CHAPTER V.—ASSOCIATIONS, SHOWS AND DEMONSTRATIONS.

47—49	Agricultural associations	8—9
50—51	Agricultural shows	9
52	Cattle shows	*ib.*
53—56	Private farms	*ib.*
57	Demonstrations of sugar manufacture	9—10
58—59	Other demonstrations	10

CHAPTER VI—AGRICULTURAL EDUCATION.

60—63	The Agricultural College	10
64	Other agricultural training	*ib.*
65	Sugar schools	11
66—67	Horticultural education	*ib.*
68—69	Weaving schools	*ib.*

CHAPTER VII.

70—73	Miscellaneous	11—12

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES,

FOR THE YEAR ENDING THE 30TH JUNE 1909.

No. $\frac{421}{V-158A}$.

FROM

W. H. MORELAND, ESQ., C.I.E., I.C.S.,
DIRECTOR, DEPARTMENT OF LAND RECORDS AND AGRICULTURE,
UNITED PROVINCES,

To

THE CHIEF SECRETARY TO GOVERNMENT,
UNITED PROVINCES, REVENUE DEPARTMENT.

Dated Lucknow, the 11th September 1909.

SIR,

I have the honour to submit the report on the administration of the department of agriculture for the year ending 30th June 1909.

CHAPTER I.

PREFATORY.

Officers of the staff.

2. I remained in charge of the department throughout the year. The Deputy Directors of Agriculture in charge of the Central and Western circles, the Principal of the agricultural college, the Economic Botanist, the Agricultural Chemist and my Personal Assistant held charge of their respective posts throughout the year, apart in some cases from short periods of privilege leave. The Assistant Director remained in charge of the Eastern circle throughout the year, having the assistance during the sugar-season from October to June of a temporary Deputy Collector, Saiyid Zamin Husain, B.A. Mr. S. A Bunting, Assistant Engineer of the Public Works Department, joined the department as Agricultural Engineer in July 1908, and served up to the 20th May 1909 when he went on combined leave owing to ill-health, and was succeeded by Mr. J. O. Affleck, Assistant Engineer.

3. Mr. A. C. Chatterjee, I.C.S., completed his special duty in connection with the industrial survey in October 1908, when his connection with the department terminated. Mr. A. C. McWatters, I.C.S., was attached to the department from November to April in order to examine the system of traffic registration on the Nepal frontier.

Tours of officers.

4. During July and August 1908 I visited the districts of Lucknow, Jalaun, Jhansi, Partabgarh, Rae Bareli, Fatehpur, Aligarh and Bareilly, inspecting departmental institutions and conferring with District Officers on various questions, the most important of which was the programme of advances for the construction of masonry wells. During October and November I visited Aligarh, Allahabad, Lucknow and Dehra Dun, and then toured for three weeks in the Unao district, examining in particular the position as to wells, the increase or decrease of groves, and the provision of adequate roads for the Rae Bareli-Unao railway. In January I was in camp in Bareilly and Budaun, studying in particular the conditions prevailing in the *bhur* tract of the latter district. In February I attended the meeting of the Board of Agriculture at Nagpur; while during March and April I visited ten districts including those in which weaving-schools are in existence.

5. The Deputy Director of Agriculture in charge of the Central circle toured mainly in Jhansi, Hamirpur and Mainpuri during the winter. He visited Nagpur in November to obtain information regarding the organisation of the Central Provinces and Berar exhibition, and again in February to attend the meeting of the Board of Agriculture; he spent a short time at Pusa on certain investigations in which he is collaborating with the Imperial Agricultural Chemist, and in May visited Lyallpur to see the trials of threshing-machines that were being conducted by the Punjab Agricultural department. He also made frequent journeys within his circle in connection with agricultural shows, agricultural associations and other matters.

6. The tours made by the Deputy Director of Agriculture in charge of the Western circle were concerned mainly with the disposal of the crop of American cotton and with agricultural shows. He also attended the meeting of the Board of Agriculture at Nagpur.

7. The Principal of the agricultural college spent the October vacation in visiting the leading agricultural institutions in Madras, Bombay, the Central Provinces and Mysore. The tours of the Economic Botanist were mainly connected with the investigations into wheat which are being carried out in conjunction with the Imperial Economic Botanist. The Agricultural Chemist spent most of January and February in experiments on sugar in Allahabad and Partabgarh: his other journeys were made for the most part to meet other officers concerned in the designing of the technological institute. The Agricultural Engineer paid frequent visits to places where landholders wished to establish pumping-plant; he also visited Calcutta in January to establish relations with engineering firms on whom the department depends for the supply of various items of equipment.

8. The Assistant Director has been on tour most of the year in connection first with the seed dépôts and later with the sugar-factories that have adopted his methods. The temporary Deputy Collector has toured in the Eastern circle with the same objects.

9. Of the officers on special duty, Mr. Chatterjee was on tour throughout July and August completing the collection of information for the industrial survey; the remainder of his period of duty was devoted to compiling the results of his survey. Mr. McWatters was on tour on the Nepal frontier continuously from November until nearly the end of March.

Special features of the year's work.

10. The year has been marked by development of existing organisations rather than by the initiation of new schemes, a fact due partly to financial pressure and partly to exigencies of staff. I think it may fairly be said that the most striking features of the year have been the development of public interest in the improvement of agriculture and stock-breeding, and the rise of the demand for labour-saving appliances in connection with agriculture. The increase of public interest in the department has reacted on the position of the subordinate service, and there are signs that it is beginning to win recognition in the eyes of parents.

11. On the horticultural side of the department, the year has seen the initiation of operations at Dehra Dun as an adjunct of the Saharanpur gardens, and the organisation of work in Kumaun under the Superintendent whose post was sanctioned in March last. The Kumaun gardens have now been transferred to the control of the Commissioner of Kumaun, as in their case the co-operation of district officials must be the first condition of success. As regards the departmental gardens generally, orders have been issued to ensure that the efforts of their superintendents shall be devoted less to building up a profitable industry for Government, and more to creating and fostering an industry in private hands. Progress in this direction must necessarily be slow; a beginning has been made during the year by discontinuing the sale of imported seed of ordinary tpye, and endeavours are being made to dispose of acclimatised seed through the trade instead of to individual purchasers, and to encourage the production of such seeds by private growers in the neighbourhood of the gardens.

12. On the industrial side, the year has been marked by the issue of Mr. Chatterjee's notes on the industries of the province, while towards its close the preliminary preparations for the Allahabad exhibition have occupied a fair share of the time of Mr. Burt and myself.

CHAPTER II.

ARBORICULTURE*.

Summary of work done.

13. The planting season though not wholly favourable was not so adverse as to interfere seriously with the fulfilment of the working plans. New planting was carried out on 94 miles of provincial roads and on 208 miles of local roads as compared with 94 and 202 miles in the working plans. There were divergencies from the working plans in several districts due largely to the disturbance of the programme caused by the drought in 1907, but as usually happens in a few instances the divergencies indicated defects in administration ; among these may be mentioned lack of suitable plants and delay in allotment of funds ; while where the early cessation of rain is alleged it may be taken that the early part of the season was wasted. The practice of planting unsuitable trees is now practically extinct, but it is to be regretted that a considerable number of cork trees were planted on provincial roads in the Jhansi district.

Extension of avenues.

14. Materials for the report on road-side planting referred to in paragraph 13 of last year's report have just been received in a complete form from the districts and will be submitted shortly. In the course of this enquiry further instances of 'paper' avenues have come to light necessitating the removal in the year under report of 95 miles of road hitherto reported as planted ; 222 miles of recent planting were recorded as established during the year, which may be regarded as a satisfactory result.

Training class for supervisors.

15. The training class for supervisors of arboriculture opened in April last at the Government horticultural gardens, Lucknow. The number of students under training is 14. This class is restricted to nominees of district boards ; applications from outside candidates were as a rule refused, as the demand for such supervisors is limited to the needs of the district boards of the province, while teaching staff is not available for unlimited numbers.

Financial results.

16. Expenditure on provincial roads rose from Rs. 34,867 to Rs. 53,524 and receipts fell from Rs. 20,760 to Rs. 18,507. The net cost to Government was Rs. 35,017 against Rs. 14,107 in the preceding year. The increase in expenditure was mainly due to the enhanced cost of protection necessitated by the successive years of drought. The general decline in income besides being a natural result of the drought, was also due to the prohibition of grazing leases. These leases will be allowed in the future under due restrictions in accordance with G. O. Circular No. 5 P. W. D., dated 23rd March 1909 and some improvement in income may be expected.

17. The receipts and expenditure on local roads rose from Rs. 49,852 and Rs. 96,879 to Rs. 50,170 and Rs. 1,02,527 respectively, the deficit being Rs. 52,357 as compared with Rs. 47,027 in the preceding year. The deficit was as usual very large in the Himalayan and Bundelkhand districts where income is practically limited to windfalls. There was a surplus in Budaun, Shahjahanpur, Bijnor, Moradabad, Pilibhit, Benares, Mirzapur and Fyzabad, due in the first district mainly to windfalls and in the remainder to the sale of the fruit crop and other annual roadside produce including grass.

CHAPTER III.

ASSISTANCE TO THE PUBLIC.

Distribution of implements.

18. I have remarked in an earlier chapter that the growth of a demand for labour-saving machinery has been one of the most striking experiences of the past year. It will be understood that this demand is arising primarily among landholders and the larger cultivators, and is largely the effect of rising wages, but from another point of view it testifies to the progress made by the staff of the department both in winning the confidence of the people and in adapting implements to the needs of the country. The change of course has only begun, but experience suggests that the demand now coming into existence will rapidly grow to an extent with which no Government department can possibly cope, and that an important implement industry must soon arise in the country in response to the demand.

*The draft of this chapter has been contributed by the Deputy Director of Land Records.

19. The implements in demand at the present time may be classed as water-lifts, tillage implements, sugar-machinery and miscellaneous articles. The chief water-lift is the hand-power chain-pump for low lifts from canals or lakes; about 250 pumps of this type were supplied by the department during the year and it was not possible to meet the demand in full, as the drought and scarcity of labour in October combined to cause a sudden rush. The irrigation department are now preparing to assist in supplying these water-lifts to the public on hire and have ordered a considerable stock for the coming season. Pumps of the same type but with rather greater lifts came somewhat suddenly into demand in the autumn, while there are signs that demand may arise for more expensive pumps worked by bullocks, as these can compete successfully with the country lifts in the shallower wells.

20. Some interest has been shown during the year in pumping installations of a more advanced type to be worked by oil engines. Two such installations are being erected at the present time with technical assistance supplied by the department, and there is every reason to think that a demand for similar machinery will arise; but the idea is at present very strange to most landholders and time is wanted for them to become familiar with it. What is required is a number of such installations working on lakes or rivers in different parts of the provinces so that landholders can see them at work and can examine their results; and I trust that it will be found possible for other public departments which require to raise water, to instal plant of a type that will interest and instruct landholders, and to make it available for their inspection.

21. The number of improved ploughs issued during the year has been 363. Most of these were of the simplest and lightest make (known as the Meston plough), but nearly 100 ploughs of the Watts type were also issued. It is particularly satisfactory to note that a landholder in Pilibhit has taken to making ploughs of the Meston type (with his own improvements), and finds them cheap and satisfactory; while one or two other landholders have recently asked me if there is any objection to their copying our designs. The answer given has of course been that, with the exception of one or two articles which are protected by patents, our patterns may be copied without obtaining permission, and that we are very glad to see any signs of new implements being made in the villages.

22. Of miscellaneous implements, there has again been a largely increased demand for hand maize-shellers and for chaff cutters; kibblers and winnowers have also been sold, while enquiries have been made for reaping machines and small threshing machines, and it is hoped that suitable types of these will be made available in the current year.

23. Six village-centres for the display and issue of implements exist in the Central circle and one in the Western circle, and I trust that it will be found possible to develop this method of supply further during the current year.

24. The expansion of the demand for implements, and for assistance in boring, has rendered it necessary to extend the equipment of the workshop at Cawnpore. As far as possible work is given out to local firms, but at the present stage few of these firms are themselves adequately equipped and much has to be done departmentally. The introduction of an oil-engine which works all the machine-tools and also the blowers for the forges has made it possible for the present to cope with the extension of work; but the establishment of an extensive implement-factory will soon be indispensable to the progress of agricultural improvement in the province, and private enterprise must meet this need.

Distribution of seed.

25. As usual, a large quantity of seed (aggregating some 400 maunds exclusive of cotton seed) has been sold in small lots to individual growers. The most striking development during the year has been the rise of a demand for ground-nut seed, of which more than twenty maunds have been issued; there seems good reason to hope that this crop, which is highly profitable in favourable conditions, will find a permanent place in the agriculture of the province, and particularly in Jalaun where the want of a good cash-bringing crop has long been recognised as a serious drawback to the success of agriculture.

American cotton.

26. Of American acclimatised cotton seed over 360 maunds were sold, most of it in the Aligarh district. The season of 1908 was unfavourable to all kinds of cotton, and the yield was very poor. The department purchased such cotton as was brought to it, and

arranged for ginning, and disposal to spinners. In the Central circle the price realised for lint, taken with the estimated value of the seed obtained, was just sufficient to pay expenses; in the Western circle the lint brought higher prices and allowing for the estimated price of the seed there was a profit of about Rs. 700, which has been distributed as a bonus on the price originally paid to growers. The bulk of the lint was purchased by Messrs. Andrew Yule and Company of Calcutta, the balance being taken by mills at Cawnpore and Delhi.

27. The future of this crop is still doubtful. If sown early enough, it grows well and yields heavily, but the problem of getting it to market unmixed with country cotton, and in quantities large enough to attract buyers, is still unsolved. Purchase of the produce by government was of course essentially a temporary expedient, necessitated (in the absence of middlemen) by the fact that the amount produced by any individual is small, and that individuals will not, and usually cannot, wait for their money till the cotton has been ginned and sold. In a few cases landholders are apparently inclined to organise a market for their cultivators, but until middlemen take up the business on commercial lines the establishment of the crop cannot be assured.

Seed dépôts.

28. The seed dépôts in the Eastern circle were again fully employed, issuing in all over twelve thousand maunds of seed grains, mostly for the *rabi* season. The 1908 crop of gram and peas had been so very poor that—in order to supply existing customers—large quantities of these seeds were purchased at famine-prices, while the stock of rice had also to be replenished by expensive purchases. The rain in April was sufficient to damage large quantities of the seed intended for the dépôts, and once again it will be necessary to replenish stock by purchases.

29. The latest audit of the accounts showed that, notwithstanding the series of unfavourable seasons, which in this part of south Oudh runs almost without a break since the frost of 1905, the financial position is quite sound, since even if all outstandings were written off as irrecoverable there would still be a surplus of assets. Much progress has been made in recovering arrears; the people do not as a rule dispute their liabilities in any way, but their temporary inability to pay is obvious; and it is expected that if the current year is favourable the arrears will be reduced to a very modest sum. On the other hand it must be admitted that a few, I think very few, customers are seeking to evade liabilities; and it was in order to prevent the spread of this attitude that the loans were brought during the past year under the provisions of the Agricultural Loans Act, so that cases of wilful default can be dealt with by the District Officer.

30. So far I have written of the dépôts from the commercial standpoint. They have, however, other aspects, benevolent and educational. The supply of good seed on fair terms in seasons such as south-east Oudh has recently experienced is a boon that I know has been widely appreciated, even where adverse conditions prevented the success of the crop; and the demand for more and more dépôts is sufficient evidence of this appreciation. On the educative side it will be remembered that it is hoped gradually to make over the seed-supply in these localities to co-operative societies, and that as a beginning the terms offered are such as to encourage borrowing by groups of cultivators with joint and several liability, such groups to form the nuclei from which societies may ultimately be developed. The success that has been achieved so far may be judged from the fact that only 800 maunds were last year lent to individuals and over 11,000 maunds to groups. The development of groups into co-operative societies is of course in abeyance until prices return to a more reasonable level.

Well sinking.

31. The well survey is not yet complete, but the additional information supplied by it during the past year supports the conclusions provisionally drawn, that while much practical good can be done by helping landholders and cultivators in difficulties of location and construction, even more can be done by making capital available for cases where lack of funds is the only obstacle to construction. A tentative scheme for providing a certain amount of money for advances annually for a period of five years was prepared by me during the year in consultation with Commissioners and District Officers, and has I understand been accepted in principle.

32. The assistance offered to the public to cope with engineering difficulties consists in the main of the staff of borers who are now (except the reserve and the

juniors in training) placed under the control of District Officers. The number posted to districts at the close of the year was fifty while ten were in training to meet requests for additional staff. In all, borings were made in 734 existing wells in order to obtain a better supply of water, and success was again attained in about two wells out of three: the percentage of success varies from less than 50 per cent. in the Meerut division to over 75 per cent. in Benares. Trial borings to locate suitable sites for proposed new wells were made in 434 cases, and one site in every three was found to be unsuitable, satisfactory springs being disclosed in the remainder. The average speed of boring has increased from 20 feet daily in the last quarter of 1907-8 to 25¾ feet, a satisfactory improvement, but the amount of time lost from various causes has been even greater than in the previous year. This is due largely to the epidemic of malaria which prevailed in the autumn and almost brought work to a standstill for two months or even longer; many of the staff were themselves incapacitated, and even when they were fit for work landholders could not find the necessary labour. Apart, however, from this disturbing factor the loss of time has been very great, and much of it must be attributed to failure on the part of tahsildars to regulate the borers' programme in advance. Rules for the control of borers have been issued during the year with the approval of Government, and contain provisions intended to reduce loss of time to a minimum, but they have not been sufficiently long in operation to enable me to form an opinion as to their effectiveness.

33. The view has been expressed by Government that control over these operations should ultimately vest as far as possible in the officers of the Irrigation department, and after discussion with the Chief Engineer, arrangements have been made to transfer one borer to his control as an experimental measure in order to ascertain the practical difficulties that may arise. Should the experiment prove successful, the rest of the staff will gradually be transferred in the districts where Irrigation officers are posted.

34. In improving existing wells the most interesting experience of the year has been gained in Jalaun and Banda. In parts of the former district it has been found possible to render several old and dry wells thoroughly efficient by borings of reasonable depth, while in other parts the water (if present) is so far below percolation level that our cheap tools are unable to bridge the gap. In Banda I permitted a borer to work experimentally in the wells of the city which was experiencing its usual water-famine in a somewhat aggravated form, and the results in the recent hot weather have been so successful that the Collector thinks it possible that the water-supply of the city may be put on a proper basis by a systematic extension of these operations, the cost of which will not of course fall on the budget of the department.

35. The most important information obtained from trial borings made during the year is the presence of *mota* (foundation-clay), and consequently the practicability of spring wells, in some of the submontane districts where it was usually believed to be absent. Thus foundation-clay was found in 13 out of 18 trials in Basti, in 22 out of 32 trials in Bahraich, and in 51 trials out of 85 in Kheri. This extension of the range of masonry wells is a point of much importance: it cannot perhaps be expected that these tracts will be fully protected against drought by means of wells, because in so many seasons wells are unnecessary, but some wells will be made, and there will thus be a nucleus of protection in years of drought.

Another fact of interest has been the location of springs of good water at a short distance below the Budaun *bhur*. Much of the soil in this tract is too weak for irrigation, at least without very heavy manuring, but anyone who has smelt the water in the present shallow wells will readily understand that a pure supply for domestic purposes will be a very great boon to the agricultural population.

36. The attempt to carry out cheap borings in the rocky country in the south of the provinces has been abandoned after exhaustive trials. It is clear that nothing but professional boring with the latest appliances will make any impression on the rocks wich have to be dealt with, and as the opinion of geologists appears to be that the chances of finding water in adequate quantities are too slight to justify a series of experiments with professional equipment, this area must continue to rely on surface-storage for its water-supply. On the other hand the services of the dynamite-overseer who is employed in helping cultivators in Jhansi to deepen

their wells through the hardest strata continue to be much appreciated in the locality.

37. I regret that little progress has been made with the two important investigations pending in connection with wells, the best design of cylinder for a percolation well, and the thickness of foundation-clay required to yield a large discharge without endangering the cylinder. After trials of various simple methods of determining the discharge, we have been driven to the conclusion that both these investigations require a water-lift, the discharge of which can be varied within relatively wide limits and controlled with considerable accuracy; no such lift appears to be on the market, and the one designed by the Agricultural Engineer has not yet been brought into working order.

38. Before leaving the subject of wells, it may be mentioned that officers from Bengal and from Eastern Bengal and Assam have been trained in our methods of boring during the past year, and that tools have been, or are being, supplied to these provinces and also to Bombay.

Poultry.

39. The Rampur State poultry farm, which is subsidised by the Local Government and is in harmonious relations with the Agricultural department, started operations during the year. So far the demand for eggs and breeding stock has exceeded the available supply and the present prospects of the undertaking are hopeful.

Extirpation of grass-hoppers.

40. I may close this chapter with a brief mention of the operations undertaken in order to extirpate, if possible, the grass-hoppers (*Hieroglyphus furciper*) which have of late been doing so much damage to sugarcane in Azamgarh and surrounding districts. After consulting the Imperial Entomologist, it was recognised that the best chance of attacking this pest is at the stage where the eggs are lying among the roots of the cane, and before the damp is sufficient to enable them to hatch out. During last April the roots in the cane-stubles were dug up and burnt in about 90 villages in the Deogaon tahsil of Azamgarh, the work being supervised by the entomological overseer of the department with the cordial co-operation of the district staff; the land was also ploughed with soil-inverting ploughs where possible. It is as yet too soon to say whether these methods have been successful as the season of damage has not arrived; but I understand that the attempt excited considerable interest locally, and that if it should prove successful it will probably be extended by the people themselves.

CHAPTER IV.

Supply of information.

Publications.

41. The following publications relating to work done by officers of the Department have been issued during the year.

(1) Notes on the Industries of the United Provinces, by Mr. A. C. Chatterjee, I.C.S.

(2) Sugarcane at the Partabgarh experimental station, by Mr. G. Clarke, Agricultural Chemist and Mr. S. M. Hadi, Assistant Director of Agriculture, (Pusa Bulletin No. 13.)

(3) Note on the results of sugar-factories during the season 1907-8, by the Assistant Director of Agriculture.

(4) Pamphlets in vernacular on :—

(*a*) Cultivation of ground-nuts;

(*b*) Cultivation of American cotton;

(*c*) Prevention of smut.

The issue of these pamphlets has been necessitated by the fact that when public interest in any particular subject is aroused the enquiries relating to it are so numerous that it becomes impossible to answer them individually; and they appear to be popular as a medium of communication with the public. They are issued in both Nagri and Urdu.

42. The following contributions to societies have been made during the year :—

(1) Studies in the experimental breeding of Indian Cottons—an introductory note Part II, contributed by Mr. H. M. Leake, Economic Botanist, to the Asiatic Society of Bengal.

(2) A glucoside from *Tephrosea purpurea*, preliminary note ; contributed by Mr. G. Clarke, Agricultural Chemist, and Mr. S. C. Banerjee, his assistant, to the Proceedings of the Chemical Society.

43. Monthly agricultural notes have been communicated to the press throughout the year by the Director. Other contributions to periodical literature have been :—

(1) Wells in the Gangetic Alluvium ; and

(2) The management of experiment stations in India, both contributed by the Director to the Agricultural Journal of India.

Vernacular journals.

44. The vernacular agricultural journal *Mufid-ul-Mazarain* has been issued in Urdu throughout the year under the supervision of the Assistant Director. The circulation has risen during the year from 980 to 1,130 copies monthly. The Porter Agricultural Association of Allahabad, has recently proposed to bring out an agricultural journal in the Nagri character, and I have promised co-operation and assistance on behalf of the department.

45. The commercial and industrial magazine *Byapari wa karigar* has continued to appear in the Nagri character throughout the year ; it is assisted by Government by subscription for a considerable number of copies and by the free supply of information ; an Urdu edition of the magazine is now promised.

Correspondence.

46. The number of correspondents in the three circles has again risen rapidly and amounts to 4,448 as against 3,468 in 1907-8. These correspondents are distributed unequally between the circles ; the central circle has 2,724, the eastern circle 1,374 (including correspondence on sugar-manufacture from all parts), and the recently constituted western circle 350 ; the work of the last named circle will probably increase now that its establishment is becoming known to the people. It is not possible to classify the subjects on which information and advice are sought, but the range of the correspondence is sufficiently wide to be a testimony to the belief in the omniscience of the department. Many enquiries received by post are exceedingly vague, and efforts are made to send a member of the staff to interview correspondents in all such cases and also wherever the enquiry appears to be of real importance.

CHAPTER V.

Associations, Shows and Demonstrations.

Agricultural Associations.

47. There is at the present time an undoubted movement towards the formation of agricultural associations in the province. It is too early yet to say whether this will be more successful than earlier movements of the same kind : the tendency in the past was for one energetic gentleman to gather round him a group of more or less quiescent members, and the 'association' as a rule was content to register its founder's views and to disappear from existence when he died or got tired of it. The department does not start associations, but when landholders wish to start an association the department offers its help in the preliminary work of organisation when assured that a sufficient nucleus of local interest exists. The organisation is carried out in close communication with the District Officer.

48. At the present time there is no active association in the eastern circle. The central circle contains two, the old established Porter Association in Allahabad and the newly founded association in Mainpuri.

The Porter Association has not been active in recent years, but an important meeting was held in connection with it in June last, and it was decided, amongst other matters, to hold an agricultural exhibition in the coming winter. The moving spirit in this association is Rai Ragho Prasad Narain Singh Bahadur of Baraun, who has assisted the Agricultural department in numerous ways. The Mainpuri Association has made a promising start with the aid of its energetic Honorary Secretary Thakur Khushal Pal Singh of Kotla. Three members of the association have undertaken the charge of village implement-agencies ; a successful agricultural show was held ; and several members have undertaken to give on their own land demonstrations of superior varieties of crops and of the use of improved implements.

49. In the Western circle reports have reached one of the associations at Bijnor, Agra and Jahangirpur (Bulandshahr). The Bijnor Association continues its previous activities. The Agra District Association has recently been organised with the Collector as president; it will I hope do good work when its organisation is complete. The Jahangirpur Association, under the presidency of Lala Ram Sarup, appears to approach the improvement of agriculture from a thoroughly practical standpoint; the Deputy Director in charge of the circle informs me that the discussions are remarkably free from vague generalities and that the members discuss the concrete defects in the local agriculture and try to apply definite remedies for each. It is this spirit which is required to render a local association a real success.

Agricultural shows.

50. No agricultural shows were held during the year in the eastern circle. In the central circle shows were held at Parsehri (Sitapur), Hardoi and Mainpuri. The shows were organised locally, but the department contributed displays and provided some prizes, while members of the staff delivered lectures in vernacular when invited to do so. The Deputy Director in charge of the circle informs me that the cultivators displayed most interest in the exhibits of crops and in the working of various implements.

51. In the Western circle the old-established shows at Kakora in Budaun, and in connection with the fairs at Aligarh, Bulandshahr, Meerut and Muzaffarnagar presented no features of special interest. An exhibition was held at Agra in connection with the Industrial Conference, and a show was organised on the occasion of the Darbar at Bareilly.

Cattle shows.

52. The cattle shows in Bundelkhand had again to be abandoned as the prevalence of rinderpest in the localities made it unsafe to collect animals in any numbers.

Private farms.

53. In the Central circle, K. Khushal Pal Singh is working four farms. Two of these are devoted mainly to the production of wheat and cotton; a third is mainly intended to show commercial results, and the fourth is for the trial of new crops. He intends to utilise the two last for an agricultural school which he hopes to establish—an interesting venture in which the department is keenly interested. K. Khushal Pal Singh has a fifth farm for experimental purposes in the Agra district, which falls within the Western circle. In the same circle a farm for experimental purposes is being laid out at Shekhupur in Budaun by S. Amin-ud-din Haidar Faridi; while I have just heard that two farms are being prepared in the Jalaun district.

54. The seed-farm established by Babu Ram Chandra Gupta in the Muzaffarnagar district continues to exist, and he informs me that in spite of certain adverse circumstances he sold Rs. 5,000 worth of pure seed, and he hopes to do a much larger business in the current year.

55. The Meerut farm, belonging to Shaikh Wahid-ud-din, Khan Bahadur, has been engaged in demonstrations, and is also the centre of an organization for the supply of seed on the lines adopted by the department in South Oudh.

56. The only private farm in the Eastern circle is that of the Raja of Chandapur at Simrauta in Rae Bareli. The Raja is keenly interested in new methods; and he has promoted the cultivation of sugarcane with such success that I understand he will have enough cane to work a small sugar-factory next season.

Demonstrations of sugar-manufacture.

57. The number of factories using the processes of sugar-manufacture introduced by the Assistant Director showed a considerable increase. Factories in Meerut, Bulandshahr, Moradabad and Allahabad districts were continued from the previous year; these were worked by their owners with technical assistance from the department, and were available for demonstration. A large concern was worked for the first time in the Rampur state: a small factory was conducted at Khatima by the Superintendent of the Tarai and Bhabar, while the Court of Wards co-operated with the department in a factory in Bareilly. Further east, a factory at Amethi in Sultanpur, was worked by Government, but will it is hoped be taken over by private enterprise in the coming season; while a small factory was worked privately at Zafarabad in Jaunpur. The factory equipped for the Raja of Chandapur in Rae Bareli could work only for a few days for want of sufficient

cane, but will it is hoped have a full season this year ; while factories have also been equipped for His Highness the Maharaja of Benares, the Raja of Mahmudabad and K. Khushal Pal Singh of Kotla in Agra. It will be seen that a large part of the province has now had an opportunity of seeing these processes at work, and the programme of the current year is being arranged so as to extend operations to places where they have not yet been seen, notably the eastern submontane districts. The same processes have been at work outside the province in the Punjab, Bihar, Assam, the Central Provinces, Rewah, Gwalior, Agar and Narsingarh. A note showing the results of the season's working will shortly be ready for distribution.

Other demonstrations.

58. In the Central circle, demonstrations of the use of implements have been given at the opening of each implement-centre, and various demonstrations have been arranged through the Mainpuri association. The working of the Raja reaping-machine has been shown to landholders. The staff is not yet sufficient to organise extensive series of demonstrations in this or in the Western circle.

59. In the Eastern circle, the land at Partabgarh, where the experimental programme is at present small and most of the land is being farmed to determine its capacity, has served effectively as a demonstration farm owing to the keenness with which the operations carried on are watched by the neighbours. They are already copying our methods of cultivation and hiring our ploughs and cattle when available ; some of them are growing maize and sugarcane on our lines ; and I found recently that the fodder crop *gwar* (*Cyamopsis Psoralioides*), which is little known in the east, has been a source of much attraction. In this circle also the staff have been so fully occupied in meeting the existing needs of the people that they have not had time to create new needs by organized demonstrations over a large area.

CHAPTER VI.

Agricultural Education.

The Agricultural College.

60. The agricultural college was brought to its full numerical strength during the year, and the first diploma examination was held in March when the students admitted in 1906 presented themselves. Thirty-three out of forty-six candidates obtained the diploma, and there were eight distinctions awarded in various subjects. The examination was conducted by the officers in charge of the various sides of the college, in conjunction in each case with an outside examiner ; and the department is indebted to the Governments of Bengal and of the Punjab for the services of examiners. The standard required for a pass was not so high as will eventually be possible ; under my instructions allowance was made for the drawbacks of unsuitable premises and inadequate equipment, as well as for the inexperience of the teaching staff ; but these drawbacks had been surmounted wounderfully well, and the success of the students was as great as I had hoped.

61. The prospects of obtaining suitable students continue hopeful ; but it is disappointing that the various landholders' associations are still slow to send students for preparation for the profession of land-agent.

62. As regards equipment, the boarding-houses and dining-halls are complete and a modern sanitary installation has been completed during the year. The reading-room has still to be extended, and a set of sick-quarters built ; projects for these works have been sanctioned. The permanent buildings for the college and research laboratories have made considerable progress, and it is hoped that the laboratories at least will be ready for fitting up by next spring.

63. The system of governing the college has been under consideration of Government during the year, and a Governing Body has now been constituted, including a non-official element.

Other agricultural training.

64. I have been consulted from time to time during the past year in connection with the agricultural course of the School-leaving examination. I have already mentioned the agricultural school which T. Khushal Pal Singh proposes to establish on his farms in Agra and Mainpuri. It is an attempt to give village-lads a brief vernacular training in agriculture generally, and practical experience of methods somewhat better than those in which they have been brought up, and its progress will be watched with interest.

Sugar schools.

65. Two sugar schools were conducted during the past season under the Assistant Director's control, one at Bareilly, the other at Amethi in Sultanpur. Students came to these in large numbers from most parts of the province, and from many other parts of India, and the keenness which they showed was remarkable.

Horticultural Education.

66. The training of the overseer classes in horticulture at Saharanpur has proceeded satisfactorily during the year. The students chosen in the previous year appeared for the diploma-exmination of the Royal Horticultural Society, and I have just heard that they have secured diplomas. Five students were taken for training during the current year, two with stipends and three at their own expense.

67. In the classes for head gardeners (*chaudhris*), the Lucknow gardens are now attracting a more suitable type of students than was the case at first, while the students at Saharanpur are of a distinctly superior type. There seems little doubt that these training classes will become real successes, and that the gardens at Saharanpur will in time develop into a school of horticulture.

Weaving schools.

68. It is convenient to mention here the weaving schools which have, for the time being, been placed under the control of the department, although they do not come under the heading prescribed for this chapter of the report. Small schools now exist in the Saharanpur, Moradabad, Hardoi and Fyzabad districts, where they are managed by committees, who have the benefit of advice and assistance from the Inspector of weaving schools who is under my control: funds are provided partly by Government and partly from local sources. The object of these schools is to train weavers to use the improved looms, and improved processes, and to assist them by advances to set up improved looms at their homes. The Moradabad school has achieved a distinct measure of success; that at Saharanpur was a failure and has now been transferred to Deoband in the same district; that at Tanda in Fyzabad was at first unpromising but is now showing signs of fulfilling its object; while that at Sandila in Hardoi has been started so recently that no opinion as to its future can be formed. In addition to these there is the Hewett Weaving School at Bara Banki, which is a more ambitious institution, manufacturing a large variety of fabrics and aiming particularly at fine work.

69. Up to the end of March 1909, 252 students had completed the course in these schools, but the present whereabouts of 72 of these has not been ascertained. Of the remaining 180, 24 are employed in teaching at other schools or in managing handloom factories; 106 are working with improved looms in handloom factories, and 50 are following their occupation at home but in many cases on their old looms. Thus it cannot yet be said that any impression has been made on the mass of the home-weavers, even in districts where the schools are established, and further experience is necessary before a decision can be formed as to the prospects of effecting an improvement in this direction; but on the other hand there is no doubt that the establishment of handloom weaving-factories has been greatly facilitated by the supply of workers, and in some cases managers. Sixteen such factories are known to be in operation, of which seven employ ten looms or more and the remainder as a rule intend to increase their stock of looms as soon as they have gained experience of the business. Of these seven, three are in Bara Banki, three in Gorakhpur and one in Saharanpur. The Salvation Army loom is much the most popular loom in these factories, while the Serampur type is practically the only one adopted by weavers working at home.

CHAPTER VII.

Miscellaneous.

70. Not much remains to be said in this chapter concerning the activities of the department; but a reference may be made to the appendix which outlines the programme of research which is in progress.*

71. The Industrial Survey has been completed by Mr. A. C. Chatterjee, I.C.S., and a decision has been taken to hold a provincial exhibition at Allahabad in the winter of 1910-11 as the next step in the promotion of industrial development. The preliminary arrangements for the exhibition have already made some

* This appendix was by an unfortunate oversight omitted from last year's report.

demand on the time of the department and will make a heavy call on its energies during the current and succeeding year.

72. Little need be said here regarding the special duty undertaken by Mr. A. C. McWatters I.C.S., in connection with the registration of frontier-trade. His recommendations for improving the arrangements for registration have already been submitted for the orders of Government ; while his notes on the state of the grazing grounds in Nipal will form a valuable record for use in future years.

73. In closing this report I must once again express my acknowledgements to the officers attached to the department, and to the executive and clerical staff, for the assistance rendered to me during the year ; to the officers of allied departments for their cordial co-operation and to the large staff of unofficial correspondents who have supplied me with so much valuable information.

I have the honour to be,

SIR,

Your most obedient servant,

W. H. MORELAND,

Director.

APPENDIX.

Statement of investigations in progress in the department.

1. *Investigations of the Economic Botanist*—The main subject under investigation deals with the genus Gossypium and has among its objects the isolation of a suitable plant for the cotton-growing area of these Provinces.

The wheats of the provinces are now in course of preliminary investigation.

The investigation of the Agaves of the province, with the object of ascertaining certain points with regard to their cultivation and the distribution of the various forms throughout the districts, continues.

2. *Investigations of the agricultural chemist.*—Mr. Clarke has unfortunately been absent from duty owing to illness for some time past, and I am unable to give a full statement of his investigations. They deal mainly with problems connected with the sugar-industry.

3. *Investigations at the Cawnpore agricultural station.*—The investigations at this farm are mostly of a fundamental nature and changes in detail only occur in these from year to year. Two series of experiments have been brought to a close during the year having yielded definite results, viz., deep and shallow tillage, and the manurial value of *nim*-cake and of cotton-refuse.

Amongst newer experiments may be mentioned the study of the manurial value of sugar-refuse (filter-press mud), calcium cyanamide, and nitrate of lime; the study of the effect of stubble-ploughing as contrasted with an unbroken fallow; and the comparison of different methods of cotton sowing. The comparison of different varieties of wheat, arhar, ground-nut and cotton continues.

The permanent experiments on the continuous growth of crops on the same land, under various manurial treatments, on rotations, on the amount of water required by the more important crops together with determination of seepage and evaporation losses continue. The study in conjunction with the Imperial Agricultural Chemist of soil-moisture relations may be added to these.

The Juhi sub-station affords opportunities for the study of the worst type of non-alkaline barren land.

4. *Investigations at the Orai agricultural station.*—The main objects of this farm are to study the general question of tillage in Bundelkhand, both generally and in relation to *kans*; to make use of some of the inferior soils; to ascertain what varieties of crops are best suited to the district; and to increase the diversification of cropping. Permanent experiments are not laid down.

5. *Investigations at the Aligarh agricultural station.*—Here too permanent experiments have not been laid down. Various experiments are in progress to test varieties and methods of cultivation of cotton, maize, ground-nut, wheat and juar, the experiments with cotton being the leading feature. Trials are also being made with sugarcane to ascertain if there is any reason why it is not grown in the locality.

6. *Investigations at the Partabgarh agricultural station.*—Here again permanent experiments are not contemplated. Most of the experiments in progress are connected with sugarcane and the processes of making sugar. The chief field experiments with cane are the trial of varieties, and determination of the effects of thick and thin sowing. Varisties of rice, maize, and hemp are being tested for suitability to the locality and jute is also being tried. Methods of checking erosion on the edge of ravines and improving the grazing thereon are also the subject of experiment at one sub-station; and the use of gypsum on alkaline land at another.

7. *Investigations in charge of the Agricultural Engineer.*—The main lines of investigation are two; the determination of suitable forms of masonry wells, and the correlation of discharge from a spring-well with thickness of foundation-clay.

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES OF AGRA AND OUDH

FOR THE YEAR ENDING 30th JUNE 1910.

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TABLE OF CONTENTS.

CHAPTER I.—PREFATORY.

Paras.		*Pages.*
2	Officers of the staff	1
3—10	Tours of officers	1—2
11—15	Special features of the year's work	2—3

CHAPTER II.—ARBORICULTURE.

16	Summary of work done	3
17	Extension of avenues	*ib.*
18	Training class for supervisors	*ib.*
19	Financial results	*ib.*

CHAPTER III.—ASSISTANCE TO THE PUBLIC.

20—26	Distribution of implements	3—4
27	Distribution of seed	4
28	Acclimatised cotton	4—5
29	Supply of *kathia* wheat	5
30—31	Seed depots	*ib.*
32—37	Well-sinking	5—6
38	Poultry	6
39	Combating insect pests	*ib.*

CHAPTER IV.—SUPPLY OF INFORMATION.

40—43	Publications	7
44—46	Vernacular journals	*ib.*
47	Correspondence	*ib.*

CHAPTER V.—ASSOCIATIONS, SHOWS AND DEMONSTRATIONS.

48—50	Agricultural associations	7—8
51—54	Agricultural shows	8
55	Cattle shows	*ib.*
56	Poultry shows	*ib.*
57—60	Private farms	9
61—62	Demonstrations	*ib.*
63	The United Provinces Exhibition	*ib.*

CHAPTER VI.—AGRICULTURAL EDUCATION.

64—67	The Agricultural College	9—10
68	Other agricultural training	10
69	Sugar schools	*ib.*
70	Horticultural education	*ib.*
71—72	Weaving schools	*ib.*

CHAPTER VII.—RESEARCH.

73	Investigations carried out by the Economic Botanist	10—11
74	Investigations carried out by the Agricultural Chemist ...	11
75	Cattle Survey	*ib.*

CHAPTER VIII.—MISCELLANEOUS.

76	Conclusion	*ib.*
	Appendix	12

REPORT

ON THE

Administration of the Department of Agriculture

OF THE

UNITED PROVINCES,

FOR THE YEAR ENDING THE 30TH JUNE 1910.

No. $\frac{778}{V\text{-}235A}$.

FROM

W. H. MORELAND, Esq., C.I.E., I.C.S.,
DIRECTOR, DEPARTMENT OF LAND RECORDS AND AGRICULTURE,
UNITED PROVINCES,

To

THE CHIEF SECRETARY TO GOVERNMENT,
UNITED PROVINCES, REVENUE DEPARTMENT.

Dated Lucknow, the 6th September 1910.

SIR,

I HAVE the honour to submit the report on the administration of the department of Agriculture for the year ending 30th June 1910.

CHAPTER I.

PREFATORY.

Officers of the staff.

The Hon'ble Mr. H. J. Hoare, I.C.S., officiated as Director during my absence on six months' leave from November 1909 to May 1910, his post as Deputy Director being filled first by Mr. J. C. Nelson, I.C.S., and then by Mr. M. Keane, I.C S. The Deputy Directors of Agriculture in charge of the central and western circles, the Principal of the agricultural college, the Economic Botanist and my Personal Assistant held charge of their respective posts throughout the year, apart in some cases from short periods of privilege leave. The Agricultural Chemist, Mr. G. Clarke, held charge of his post, with an interruption of seven weeks at the beginning of the year, up to the 6th November, when owing to ill health he was obliged to proceed home on a year's leave. Mr. H. E. Annett, who was appointed to officiate for him, went on privilege leave for three months from 29th April 1910. The Assistant Director, Saiyid Muhammad Hadi, Khan Bahadur, remained in charge of the eastern circle throughout the year, having the assistance up to August 1909 of a temporary Deputy Collector, Saiyid Zamin Husain, who was appointed second Assistant Director from the middle of October 1909. Mr. J. O. Affleck, Assistant Engineer of the Public Works Department, officiated as Agricultural Engineer of the department till the 25th November 1909, when Mr. S. A. Bunting, the permanent incumbent, resumed his duties on return from leave, but owing to the exigencies of the department in technical work Mr. Affleck was retained as additional Agricultural Engineer up to the 2nd January 1910.

Tours of officers.

3. My rains tour in 1909 was spent mainly in inspecting various departmental institutions, in examining the work in connection with well-boring in various districts, and in attending the Cattle Conference at Lucknow. In October I visited Benares, under the orders of Government, to discuss with His Highness the Maharaja the lines of a policy for the industrial development of his Domains. The early part of November was occupied as usual by the Civilians' training class at Cawnpore. Under the authority of Government, a portion of my leave was spent in negotiating with firms whom it was desirable to have represented at the coming Exhibition.

4. The winter tour of the officiating Director was necessarily curtailed by his duties as a member of the Legislative Council. Examination of the prospects of a revision of settlement in Etawah occupied the time that was available in

134159

December and January ; later in the season he attended the meeting of the Board of Agriculture at Pusa and visited various districts of the provinces in connection with current work.

5. The Deputy Director of Agriculture in charge of the central circle has been responsible throughout the year for the organization of the agricultural court of the United Provinces Exhibition, and most of his journeys have been made in connection with the exhibition and the closely allied subject of the trade in agricultural implements and machinery. They also included a visit to Central India in September to purchase wheat seed, inspection visits to the Orai agricultural station, visits to districts within the circle in connection with agricultural shows and a few visits where agricultural advice was required. He also attended the Cattle Conference at Lucknow in August 1909 and the meeting of the Board of Agriculture at Pusa in February 1910, and visited the Lahore Exhibition in December 1909. Two tours were also made with the Imperial Agricultural Chemist in Mainpuri district in October and March respectively, in connection with their joint investigation on water-logging and alkali on the Bhognipur branch of the Lower Ganges Canal.

6. The Deputy Director of Agriculture in charge of the western circle attended the Cattle Conference in August, and the meeting of the Board of Agriculture in February. He also toured through his circle as occasion required in connection with demonstrations and agricultural shows.

7. The Assistant Director of Agriculture in charge of the eastern circle travelled mainly in connection with the equipment and working of the numerous sugar-factories distributed over the province ; while most of the temporary Assistant Director's time was divided between sugar-factories and the seed depots at work in this circle.

8. The Principal of the agricultural college was not on tour during the session, but spent part of his vacation in visiting the agricultural colleges in Bengal and the Punjab.

9. The Economic Botanist made no regular tours, but he attended the meeting of the Board of Agriculture, and visited the Madras presidency as examiner at the Coimbatore Agricultural College. The officiating Agricultural Chemist as usual spent part of the cold weather in supervising the sugar-experiments at Partabgarh, and also attended the meeting of the Board of Agriculture at Pusa.

10. The journeys of the Agricultural Engineer and officiating Agricultural Engineer were undertaken mainly to advise landholders regarding the installation of pumping machinery, and to inspect the installations where carried out.

Special features of the year's work.

11. It is probably fair to say that the most striking features of the year have been, on the one hand, the interest taken by the public in the work of the department, and on the other, its success in getting more closely in touch with the people. The public interest is reflected in the proceedings of the Legislative Council, which has given the department a fair share of its attention ; but it is seen directly in the growing volume of correspondence with individuals on nearly every agricultural subject as well as on some that can scarcely be classed as agricultural.

12. The Cattle Conference held at Lucknow in August 1909 was a notable event, not so much for its recommendations on particular points, as for the spirit in which its deliberations were conducted under the guidance of its President (the Hon'ble Mr. D. C. Baillie, C.S.I.) ; and it has furnished the officers of the agricultural and veterinary departments with an authoritative body of information on the subjects under discussion which will serve as a guide to their activities for some time to come.

13. The organisation of the Agricultural Court of the United Provinces Exhibition has been in progress during the greater part of the year, and the steps taken to secure the necessary publicity have already been successful in arousing among manufacturers in England and elsewhere a new and practical interest in the potential market of Northern India, an interest which, it is hoped, will be manifested next December in the display of a considerable number of implements designed for the first time to suit the special needs of the market.

14. The only important change in the organisation of the department during the year has been the constitution of a governing body for the agricultural college,

including the officers connected with the college and representatives of the department of Public Instruction as well as two non-official members. In other respects there has been development of work along the lines previously laid down.

15. The Local Government accepted a suggestion put forward in Council for the appointment of honorary visitors to the various agricultural stations. Nominations of gentlemen willing to accept this position are now being made by Commissioners, and I anticipate considerable advantages to the department from their co-operation and suggestions.

CHAPTER II.

ARBORICULTURE.*

Summary of work done.

16. The planting season of 1909 was favourable. New planting was carried out on 103 miles of provincial roads and 214 miles of local roads as compared with 114 miles and 211 miles provided for in the working plans. The most common cause of divergence from the working plan was the curtailment of new planting in favour of gap filling, but in several districts the cause was less legitimate revealing defects in, or want of attention to, the working plans. Thus in Farrukhabad the failure to plant was due to lack of seedlings and in Etah the land chosen was found to be unsuitable for planting owing to its barrenness. The planting of unsuitable trees has almost ceased in the provinces, the only case of the least importance being the plantation of 50 such trees in the Gonda district.

Extension of avenues.

17. The report on roadside planting referred to in paragraph 14 of the last year's report was submitted during the year. The annual returns of arboriculture received for the year shew that 50 miles of 'paper avenues' have been further removed from avenues whilst 314 miles of recent planting have been added as established.

Training class for supervisors.

18. The training class for supervisors opened in April last at the Lucknow Government Horticultural Gardens and is being attended by eleven students nominated to it by district boards. The number of students is thus limited to the demand of the district boards for overseers.

Financial results.

19. The receipts and expenditure on provincial roads rose from Rs. 18,507 and Rs. 53,524 to Rs. 25,729 and Rs. 59,676 respectively. The net cost to Government was therefore Rs. 33,947 as compared with Rs. 35,017 in the preceding year. The improvement in income is the result of grazing leases being allowed under due restrictions as mentioned in last year's report. The expenditure on local roads was Rs. 98,005 which was Rs. 4,522 less than in the preceding year. Receipts rose slightly from Rs. 50,170 to Rs. 50,261.

CHAPTER III.

ASSISTANCE TO THE PUBLIC.

Distribution of implements.

20. The demand for labour-saving implements presented in the main the same features as in the previous year. The most important difference was a reduction in the demand for chain-pumps, attributable to the more favourable character of the seasons; this demand is ordinarily most intense when deficient rain in September has created an urgent need for irrigation of rice and of land for the *rabi*. A considerable number of these pumps was supplied to the Irrigation Department for issue on hire to cultivators in the various canal divisions; I have not yet heard whether this additional facility has been made much use of by the people. There are signs that this type of pump may now find a footing outside the canal districts in tracts where much irrigation is done from natural sources with low lifts; thus several pumps have been sold by a sub-centre located at Domariaganj in the Basti district, and the Collector, who has interested himself in the matter, thinks that there is much scope for lifts of the kind.

21. The type of chain-pump supplied has been largely altered by the Agricultural Engineer, and the machines are now distinctly more effective and durable than those supplied in the past.

* I am indebted to the Deputy Director of land records for the draft of this chapter.

22. The number of iron ploughs issued during the year was 525 (against 363 in the previous year), the Meston type again predominating; the demand for these ploughs is naturally largest in the central and western circles where the cattle are better than in the east, but Basti has taken a remarkably large share. Sales of chaff-cutters have numbered 74, and the turn over of other implements has been considerable in the aggregate.

23. I think it is now fairly safe to say that the centrifugal for separating molasses has come to stay, not only as an adjunct to the Hadi processes of sugar-manufacture, but also in the indigenous industry. A representative of an English firm, which has taken great pains to adapt its machines to local conditions, spent part of the season in the province and was able to dispose of several centrifugals without the intervention of the Department, while the manufacture of these machines has, I understand, been started on a small scale in the Punjab.

24. The best methods of introducing implements and machinery of proved utility have received much attention during the year. The functions of the Department in regard to any particular implement should be regarded as temporary, the supply being undertaken only until the business is large enough for private enterprise; and it seems to me that private enterprise should very soon be able to work at a profit on several important lines. It is hoped that developments in this direction may result from the forthcoming Exhibition: meanwhile, it has been found possible to make arrangements in some cases by which the stock of implements is held by Indian firms instead of by the Department, and to pass on indents to local firms for direct supply. Efforts too are being made to encourage the system of hire-purchase as opposed to hiring, and care is being taken that implements are not sold at unduly low prices.

25. The system of sub-centres has continued to be the principal means of popularising implements, reinforced by demonstrations in the vicinity of the places where implements are stocked. The degree of success attained by these sub-centres has naturally varied with the efforts of the managers, who are in all cases honorary, but all those that have been established for a sufficient time have done useful work. The extension of the system is contemplated, but its working is limited for the present partly by the smallness of the capital sum that can be locked up in implements and partly by the want of larger supervising staff. In this matter there is very practical and useful work ready to the hand of any local agricultural association, which will carry its own stock of implements and take an interest in their demonstration and distribution.

26. Not much progress can be reported in the matter of installations of power pumps. Enquiries have been fairly numerous, but it has become clear that the idea is too unfamiliar to be taken up by ordinary landholders; and in order to make progress in introducing this most important improvement it is necessary that Government should set up a certain number of installations and for a time at least bear the cost of working them, while charging a rate on the land irrigated. If the Irrigation Department is prepared to undertake this function, I believe that a sufficient number of landholders would at once come forward to enable a satisfactory series of demonstrations to be arranged. Through the investigations of the Agricultural Engineer, adequate data are now available for framing projects of the kind so far as concerns the capacity and efficiency of various types of plant, and the other factors to be taken into account are substantially the same as those of an ordinary irrigation project.

Distribution of seed.

27. Distribution of seed on cash payment has been carried out on a large scale during the year, the total quantity aggregating about 1,200 maunds, of which 915 were issued from Cawnpore. The largest issues were as usual of wheat, and in addition to the above figures a number of indents were placed with the Sisauli seed-farm in Muzaffarnagar. Agriculturists are beginning to display considerable interest in the ground-nut crop, as applications for small quantities of seed have been numerous, particularly in Jalaun. One great advantage connected with this crop is that the produce appears to be readily marketable from the first: the marketing of a newly-introduced crop is ordinarily one of the chief difficulties attending its establishment.

Acclimatised cotton.

28. The experience gained in the cultivation of the acclimatised American cottons has been disappointing, as the existing market was not prepared to pay a price sufficient (after

meeting incidental charges) to remunerate the grower for the extra expense required to produce the finer quality of lint. Before the year under report, the produce was bought by the Department and sold in quantity to consumers: the Government of India however objected to the continuance of the financial arrangements which this involved, and an alternative was not easily devised. It has therefore been decided not to advise cultivators to persevere in production unless they are assured of a favourable market.

Supply of *kathia* wheat.

29. There were widespread apprehensions that owing to rain during the harvest of 1909, sound seed-wheat would be difficult to procure, particularly in some districts of the central circle. Careful enquiries were made through various agencies and it was ascertained that as a rule the apprehensions were unfounded, except in particular localities where assistance was given on the ordinary lines. Bundelkhand however was undoubtedly short of the *kathia* variety of wheat which the people prefer to grow, and at one time it seemed probable that extensive operations would have to be undertaken. Fortunately in Banda and Jhansi the trade took the matter up and obtained adequate supplies of seed from Central India: but in Hamirpur, with its notoriously inadequate means of communication, the trade made no attempt to obtain seed from outside and the price of local supplies became prohibitive. To meet the needs of this district the Deputy Director purchased supplies in Central India which were sold in the district for cash. The effect of the operation, which was carried out ultimately with little loss, was to bring down local prices to something like a reasonable figure, the price at Hamirpur falling from $5\frac{1}{2}$ to $7\frac{1}{2}$ sers (local weight) in the course of a few days. It may be mentioned that it was necessary to bring this seed by rail to Cawnpore and cart it thence to Hamirpur: had the long-contemplated railway through the district been in operation, there is little doubt that private trade would have met the needs of Hamirpur as it met those of Banda and Jhansi, but our experience shows that with the existing means of communication this could hardly have been done at a profit, and till the railway is made Hamirpur will always need assistance when local stocks are seriously inadequate.

Seed depots.

30. The operations of the seed depots in the eastern circle continued on the same lines as in previous years. The main changes were (1) the opening of a District Board depot at Akbarpur in Fyzabad, (2) a re-arrangement in Sultanpur under which the District Board finances and manages the depot in the headquarters tahsil, while the Department manages those at Amethi and Kadipur. It is intended to open a new depot at Benares when the agricultural station is equipped: while the additional funds sanctioned by the Court of Wards for the Jaunpur depot will, it is hoped, enable that depot to work with greater success.

31. Seed was issued by the depots on the same scale as in the previous year (about 12,000 maunds in all), and most of it was issued to groups of cultivators under joint and several liability. Issues were also made at the request of the Registrar to a few co-operative societies. Recoveries have been good during the year, and the financial position of the provincial depots is quite sound, showing a considerable accumulated profit.

Well sinking.

32. I have in previous reports laid emphasis on the fact that want of capital is the chief obstacle to the sinking of more wells in the tracts where they are most needed. During the past year I understand that the funds available for advances have been materially increased, and the hope may be expressed that this policy will be continued until the limit of the absorbing power of the people is reached. The direct concern of the Department is however with engineering rather than with financial hindrances. The work done in the way of well-boring has substantially increased during the year; there has been rather less demand for trial-borings, but this has been much more than counterbalanced by the increased demand for sinking pipes to deeper springs in existing wells. In the trial borings, a suitable site was indicated in 72 per cent. of the 292 trials made; the demand for this work is largest in the Meerut division where (as is well-known) the distribution of suitable beds of foundation-clay is most irregular; but I am glad to see it continues in Kheri and Bahraich, where as I remarked last year an increase in the number of wells is much to be desired, although it is scarcely to be expected that these districts will ever be entirely protected against the consequences of drought. The supply of water in existing

wells was increased in just two-thirds of the 1,353 cases in which it was attempted. In Meerut and Rohilkhand the figures suggest that it is about an even chance whether the operation succeeds or fails, while in south Oudh the proportion of successes ranges from 70 to 90 per cent.

33. The daily average speed of boring—an important point as determining the cost to the owner of the well—has been fairly maintained, working out to close on 24 feet for the whole year; I hope this figure can be still further raised as I have been able recently to dispense with the service of some of the least efficient workmen. The avoidable loss of time has again been very great in some districts, and much more work could have been done by the existing staff if their programmes had been more carefully regulated.

34. Mention was made in last year's report of the success obtained in boring wells in the Banda municipality. I have allowed my well engineer to assist the Municipality with his advice during the past year, and the following extract from the annual report of the Municipality for 1909-10 shows what has been accomplished. "Boring was also carried out in most of the important drinking wells and has proved a great success; many wells which previous to boring dried every year still possess a large quantity of sweet water, and there is every hope of the supply lasting throughout the hot weather. Should this prove the case the deficiency in drinking water from which this town has hitherto suffered every year will be completely removed." A demand is now arising for boring in this district outside the municipal area, which has served effectively as a demonstration.

35. The experience gained in regard to implements and methods of boring was collated and reviewed during the year at a conference held by the officiating Director, at which various changes in the design of implements were agreed upon, and arrangements made for the speedier execution of repairs and other matters of detail.

36. During the year sets of tools were supplied to the Government of Eastern Bengal and Assam and to His Highness the Maharaja of Benares; while two supervisors have been trained for the Punjab Agricultural department and a third is under training.

37. As regards experimental work, the Agricultural Engineer has prepared a report on the year's work in connection with percolation-wells, but at the time of writing I have not been able to study it in detail. There has been further delay in obtaining the pump and engine designed for testing the yield of wells in order to obtain data as to the possibility of pumping from them. The machinery has at last arrived from England and will now be tested.

Poultry.

38. During the year the Local Government entered into partnership in a poultry farm at Haldwani, which is intended to facilitate the keeping of poultry by the supply of suitable birds and eggs, and by the introduction of useful accessories which are at present too little known. The subsidy to the Rampur State poultry farm has at the same time been discontinued as it is considered that the Haldwani farm will for the present meet the needs of the province.

Combating insect pests.

39. The Department is not yet in a position to deal effectively with any large proportion of the insect pests of the province. Continued efforts have been made to check the grasshoppers (*Hieroglyphus furcifer*) which have been doing serious injury to sugarcane in the eastern districts, especially in Azamgarh. Improvement is reported from the areas dealt with in previous years, but the treatment recommended (digging the cane-stubbles in the hot weather) has been found difficult to organise for the reason that the cultivators (who are not in a position to hire much labour) are very busy in nursing the young sugarcane through the dry months and cannot always spare time from hoeing and irrigating to dig the stubbles effectively. An attempt will be made in the current year to secure organised action on the part of the larger estates on which the pest is found. In the central circle, which at present is the only one with a trained entomological assistant, demonstrations have been given of spraying for the mustard aphis (*Aphis Brassicae*), and "bagging" the rice bug (*Leptocorisa varicornis*). A second trained assistant is expected shortly from Pusa.

CHAPTER IV.

Supply of information.

Publications.

40. The only English publication issued separately by the Department during the year has been a pamphlet entitled *Northern India as a Market for Agricultural Machinery*, which was prepared for the assistance of intending competitors at the United Provinces Exhibition. Vernacular pamphlets were issued on—

(1) Cultivation of lucerne.
(2) Rabi harvesting, the use of reaping machines and winnowers.
(3) Improved methods of growing maize.

41. Arrangements are being made to distribute vernacular bulletins as issued to the village schools of the province in accordance with a promise made in the Legislative Council.

42. The *Pusa Memoirs* issued during the year included the following:

(1) The influence of the environment on the milling and baking qualities of Indian wheat, by A. Howard, H. M. Leake and Gabrielle L. C. Howard. (Botanical series, volume III, no. 4.)
(2) The nature of the colour of black cotton soil, by H. E. Annett (Chemical series, volume I, no. 9).

43. Monthly agricultural notes have been contributed to the press as usual throughout the year. The Director contributed an article on the Cattle Conference at Lucknow to the *Agricultural Journal of India:* the same journal contained an article on the efficiency of the Hadi processes of sugar-manufacture by the Agricultural Chemist and his assistant.

Vernacular journals.

44. The vernacular journal *Mufid-ul-mazarain* has been issued throughout the year. Its circulation has risen from 1,130 to 1,327, the increase being in part due to the action of Government in the Irrigation Department in taking in the paper for the use of subordinates of the department. Arrangements have been made for the occasional inclusion of articles on insects of economic importance illustrated by admirable plates, for the supply of which we are much indebted to the Imperial Entomologist.

45. Assistance has been given to a Nagri agricultural journal named the *Dehati*, which was started during the year; the department subscribes temporarily for a limited number of copies for free distribution, and gives general advice regarding the treatment of agricultural topics besides allowing the reproduction of articles from the *Mufid-ul-mazarain* and other departmental pamphlets. This journal has made a fair start, but it is too soon to say whether it will establish itself permanently. The Nagri journal proposed by the Porter Agricultural Association of Allahabad has not yet appeared.

46. The assisted commercial journal, *Byapari wa Karigar* has continued to appear during the year.

Correspondence.

47. The agricultural inquiries received during the year numbered 5,864 cases as against 4,448 in the previous year. There is a decline in the central circle due apparently to the fact that the existence of the other offices is becoming more widely known, but the enquiries in the western circle have risen from 350 to 574 and in the eastern circle from 1,374 to 2,886. The bulk of the correspondence in the last-named circle refers to the sugar-industry, enquiries regarding which numbered 1,762. The range of subjects over which the correspondence travels shows no signs of diminishing.

CHAPTER V.

Associations, shows and demonstrations.

Agricultural associations.

48. There is at present no active agricultural association in the eastern circle. In the central circle the Mainpuri and Allahabad associations have been fairly active during the past year. The Mainpuri association maintains three sub-centres for the supply of agricultural implements, and several of its members have interested themselves in the cultivation of groundnuts and of approved varieties of staple crops.

The Porter Agricultural Association of Allahabad, which was reorganised last year, held a successful agricultural show at Allahabad last Jannary, and several of its members are rendering material assistance in connection with the United

Provinces Exhibition. A number of its members have taken up the cultivation of groundnuts on a small scale.

49. The Gouri Kalan Co-operative Bank in Unao has shown itself during the past year to form for all practical purposes a very useful Agricultural Association. Through the agency of its President departmental vernacular publications have been brought to the notice of its members. The cultivation of groundnuts has been introduced, a small agricultural show was arranged in connection with a local fair, and the members of the bank adopted successfully the Department's recommendations for preventing smut on *juar*. A further development showed that they had grasped the broader principles of co-operative purchase and sale, for the bank not only purchased seed and copper sulphate for the use of its members but also approached the Department for assistance in disposing of some 2,500 maunds of rabi produce to a European firm in Cawnpore, for which satisfactory arrangements were made. A village sub-centre for the supply of implements has also recently been opened in connection with the bank.

50. In the western circle, associations are at work in the districts of Bijnor, Agra and Bulandshahr. The Bijnor association has not been active during the year, but the Jat Sabha in the same district has shown some enterprise in bringing labour-saving implements to the notice of its members. The Agra district association has been completing its organisation, and its tahsili branches have interested themselves in the supply of produce to the Exhibition. Individual members of this association have made various practical efforts for the benefit of the locality. The Jahangirpur association in Bulandshahr has continued its practical activities, and is doing work of considerable value in popularising new crops and new implements.

Agricultural shows.

51. In the central circle shows were held at Allahabad, Sitapur (in connection with the revival of the Khairabad fair), Hardoi and Mainpuri. The Gouri Kalan show has already been referred to and in addition two small displays of implements and crops were arranged in Cawnpore district in connection with local fairs. At Allahabad the district exhibition lasted for nearly a month covering the period of the Magh Mela. The local agricultural association arranged for all crop exhibits, the department providing judges and special exhibits. The department arranged for a continuous demonstration of agricultural implements and waterlifts, and implements to the value of Rs. 783 were sold. Unlike most district shows this was visited by pilgrims from all parts of the province, and its effect on the agriculture of the province is difficult to gauge. Particular interest was shown in the working of ploughs and chain-pumps, and the number of orders booked showed that the demonstration of chaff-cutters, maize-shellers and kibblers was appreciated.

52. The Mainpuri show was, as last year, organised by the agricultural association and was fairly successful though somewhat hastily organised. The Hardoi show was a distinct improvement on last year as regards both the class of exhibits and the interest taken in the show and the demonstrations. The Khairabad (Sitapur) show included some good samples of agricultural produce and the demonstrations appeared to be appreciated.

53. In the western circle shows were held at Kakora (Budaun), Aligarh, Bulandshahr, Meerut and Muzaffarnagar. The Deputy Director in charge of the circle has found that the display of implements at most of these shows leads to very little practical result; the shows in the Meerut division are essentially holiday affairs, and business is not treated too seriously at them.

54. In the eastern circle shows were held at Sultanpur, Debi Patan (Gonda), and Bahraich; while the Assistant Director organised exhibits of sugar manufacture for various shows in the other circles.

Cattle shows.

55. Five cattle shows were held during the year at centres in the Banda district. On the experience gained, it has been decided by the Collector on the recommendation of the Superintendent of the civil veterinary department to abandon three of these, and in the current year shows will be held at Karwi and Surdhua, where the shows appear to have excited some degree of interest among the people.

Poultry shows.

56. Under instructions from Government, poultry shows were organised by the District Officers of Bareilly and Lucknow during the year. No report of their result has reached me.

57. In the central circle there are four private farms worked by the Hon'ble Thakur Kushalpal Singh, and one by Rai Ragho Prasad Narain Singh Bahadur at Baraon in Allahabad. Reports have not been received from either up to date, but Thakur Kushalpal Singh's farms are continuing on previous lines. The Baraon Farm is a small area chiefly devoted to the trial of new crops and new varieties; a considerable area is however devoted to sugarcane for the adjoining factory.

Private farms.

58. In the western circle the Sisauli seed farm in Muzaffarnagar rendered considerable assistance in the supply of sound wheat-seed for other parts of the provinces, and in addition dealt with several applications received at Cawnpore from outside the province, for wheat, oats and barley seeds. Only one complaint was received which on investigation proved to be due to delay on the railway. This farm handled seed to the value of Rs. 9,130; it is a useful institution and will, I hope, prove successful.

59. The Meerut demonstration farm was worked on the same lines as in previous years.

60. In the eastern circle the Raja of Chandapur maintained the Simrauta farm in the Rae Bareli district. This farm is useful for demonstrations and connected with it is an organisation for the supply of seeds and implements to the Raja's tenants. The Raja last year opened a branch farm at Chandapur, designed mainly to popularise the cultivation of sugarcane.

61. The staff of the central circle, on which falls the main burden of work connected with the agricultural court of the United Provinces Exhibition, has not been able to undertake any extensive scheme of demonstrations. The use of various implements has been steadily demonstrated at agricultural shows, and at the various implement centres; while the demonstration-plots maintained by the Mainpuri association have been visited. In the western circle, an extensive series of demonstrations of improved methods of sowing maize was organised and carried out, and the Deputy Director reports that considerable interest has already been excited in the areas covered by the demonstrations.

Demonstrations.

62. The demonstration work of the eastern circle has for the most part consisted of sugar-factories working on the methods recommended by the Assistant Director. Of the factories mentioned in the previous year's report all continued to work (on their own resources but with occasional assistance from the Department), except those in Bulandshahr and in the Bhabar. Private reasons involved the closure of the former, while the latter was not considered suitable in the local circumstances. Eleven new factories were started in the year, and in accordance with the usual practice were given a considerable amount of assistance in management by the trained staff of the circle; practically all portions of the province, except the Gorakhpur division, have thus in the past year had an opportunity of seeing these processes at work. The financial results of these factories will form the subject of a separate publication.

63. The chapter would not be complete without a reference to the preparatory work carried out during the year in connection with the agricultural court of the United Provinces Exhibition. The general scheme of the court, prepared by me in consultation with the Deputy Director in charge of the central circle, was approved by Government at the beginning of the year, and the Deputy Director was then placed in charge of the organisation of the court. The work has proved extremely heavy, involving a very large mass of correspondence with actual or potential exhibitors; but I trust that the result will show that Mr. Burt's labour has not been wasted, and that the agricultural court will not fall behind the rest of the exhibition in interest and practical utility.

The United Provinces Exhibition.

CHAPTER VI.

AGRICULTURAL EDUCATION.

64. The agricultural college remained full during the year. The second final examination was held in April when 33 out of 40 students obtained the degree of L. Ag., the conferment of which has now been authorised by the Government of India. Ten

The Agricultural College.

distinctions were obtained by students in particular subjects. The Department is indebted to the Government of India and the Government of Bengal for the services of officers taking part in the examination.

65. The imposition of fees has now been definitely decided on, and the experience of the current year will throw light on the effect of this step on recruitment. Meanwhile it may be noted that the offer made to the leading associations of landholders to receive their nominees as students for the profession of land-agent produced only one nomination : it is hoped that a large number will be nominated for the current year.

66. The equipment of the college made further progress during the year : the students' reading-room has been enlarged ; the sick-quarters are completed and in use; and new stabling has been provided for the college horses and cattle. The permanent buildings of the college have made considerable advance ; the two wings are nearly out of the builders' hands, and the necessary fittings are being placed in them, while the construction of the main block is expected to be finished during the current year.

67. The Governing Body of the college held three meetings during the year for the disposal of business connected with the college. Its constitution has now been altered by the addition of the Director of Public Instruction, while the Deputy Director of land records has replaced the Director as President of the college.

Other agricultural training.

68. The Deputy Director in charge of the central circle informs me that little progress appears to have been made so far with the agricultural school of the Hon'ble Thakur Kushal Pal Singh.

Sugar schools.

69. Four training-centres for students of the art of sugar-making were maintained during the past season on the lines previously followed and fifty-one students were trained.

Horticultural education.

70. The scheme of horticultural education at Saharanpur and Lucknow has been carried on during the year, and the supply of students for the head gardeners' class *(chaudhris)* has been so satisfactory that the numbers of the annual classes have been raised to twelve annually, while the class of apprentice-gardeners at Lucknow, which was never a real success, has been dropped.

Weaving schools.

71. Last year there were in operation the large weaving school at Bara Banki and four smaller schools in the Saharanpur, Moradabad, Hardoi and Fyzabad districts. During the year the Saharanpur school has been moved to Deoband; the weaving-schools Inspector was called in to reorganise a school at Almora, with which I was not previously connected : it was decided to open a blanket-weaving school at Muzaffarnagar; and the Inspector assisted in the organisation of schools at Mianganj in Unao and at Shahjahanpur.

72. Owing to my absence on leave I have been unable to inspect these schools in the last six months, and prefer to refrain from comment on their working. Their supervision will shortly be handed over to the Director of Industries, by whom Government will be advised regarding their future. It may however be said that during the year 164 students were trained while 100 left the schools without completing their course. Of the 164, 84 bought improved looms, 52 are employed in hand-loom factories, 12 are teaching, and 16 have been lost sight of. These figures are on the whole promising.

CHAPTER VII.

Research.

73. The progress of the agricultural investigations carried out under the Deputy Directors and Assistant Directors is detailed in the reports on the various agricultural stations which are issued annually, and need not be recapitulated here ; but a few words are necessary regarding the researches in progress under the Economic Botanist and the Agricultural Chemist, who do not issue separate reports. The Economic Botanist supplies the following note :

Economic Botanist.

" Nearly the whole of my time has been given to work on the cotton crop which is now being carried out on a considerable scale. It is hoped that the isolation of pure races of indigenous

varieties possessing longer and finer staples than those now commonly cultivated within the province has been effected. The reports on the samples of the fibre of these races are encouraging.

"The investigation into the wheats of the province has proceeded, some 1,700 samples having been grown and analysed botanically as a preliminary to the identification of the agricultural types and subsequent isolation of the most promising of these for extended culture.

"The experiments on the influence of the environment on the milling and baking qualities of wheats in India commenced by the Imperial Economic Botanist have been extended and the stations where wheat is now grown for the purpose of these experiments include five stations in these provinces. At the request of the Imperial Economic Botanist I have recently entered into collaboration with him in these experiments and a joint account of the experiments, as far as results are available, has appeared in volume III, no. 4, Botanical series, Memoirs of the Imperial department of Agriculture in India."

74. The note received from the officiating Agricultural Chemist is as follows:

Agricultural Chemist.

"With regard to the investigations being carried out, several definite points have been made. The sugarcane experiments at Partabgarh this year give indications that sugarcane in that district is normally planted much more thickly than it need be. The results however will probably not be published until a further season's evidence has been obtained.

"Mr. Clarke's work on the glucoside which occurs in *Tephrosia purpurea* (a weed occurring commonly in these provinces) was continued by him. This work is important as the glucoside yields quercetin which is a commercial article. Incidentally the purely scientific side of the work on this glucoside has led to important results."

Cattle survey.

75. On the economic side of the Department the most important investigation undertaken during the year is a survey, which is being carried out district by district, of the sources from which cultivators obtain their cattle, and of the mechanism of collection and distribution. The object of this survey, which has been undertaken on the recommendation of the Cattle Conference, is to supply the necessary basis of facts for a policy of improvement in the supply, in regard both to numbers and to quality.

CHAPTER VIII.

Miscellaneous.

Conclusion.

76. The main activities of the department have been indicated in the foregoing chapters, and nothing remains to be said under this head beyond expressing my acknowledgements to the officers of the department, and to the executive and clerical staff, for the assistance rendered; and to the numerous non-official gentlemen who have supplied me with so much information of value on matters affecting the agriculture of the Province.

I have the honour to be,

Sir,

Your most obedient servant,

W. H. MORELAND,

Director.

APPENDIX.

Statement of investigations in progress in the department.

1. *Investigations of the Economic Botanist.*—The main subject under investigation deals with the genus Gossypium and has among its objects the isolation of a suitable plant for the cotton-growing area of these Provinces.

The wheats of the provinces are now in course of investigation ; and the Economic Botanist is collaborating with the Imperial Economic Botanist in investigations on the influence of the environment on the milling and baking qualities of wheats in India.

The investigation of the Agaves of the province continues.

2. *Investigations of the Agricultural Chemist.*—The investigation of various points in connection with the cultivation of sugarcane and their influence on the yield of sugar continue.

The investigation of the glucoside which occurs in the weed *Tephrosia purpurea* is being continued by the Agricultural Chemist during his leave.

3. *Investigations at the Cawnpore Agricultural station.*—The investigations at this farm are mostly of a fundamental nature and changes in detail only occur in these from year to year. Amongst newer experiments may be mentioned the study of the manurial value of sugar-refuse (filter-press mud), calcium cyanamide, and nitrate of lime; the study of the effect of stubble-ploughing as contrasted with an unbroken fallow; and the comparison of different methods of cotton-sowing. The comparison of different varieties of wheat, arhar, groundnut and cotton continues.

The permanent experiments on the continuous growth of crops on the same land, under various manurial treatments, on rotations, on the amount of water required by the more important crops together with determination of seepage and evaporation losses continue. The study in conjunction with the Imperial Agricultural Chemist of soil-moisture relations may be added to these.

The study of the causes involving the reported increase of alkali in certain canal-irrigated tracts and its relations to the sub-soil water-level has been taken up by the Deputy Director of the central circle in conjunction with the Imperial Agricultural Chemist.

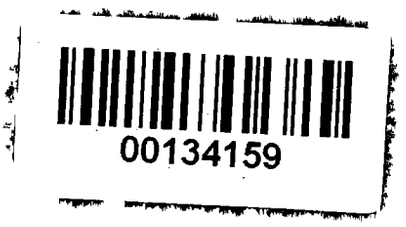
The Juhi sub-station affords opportunities for the study of the worst type of non-alkaline barren land.

4. *Investigations at the Orai agricultural station.*—The main objects of this farm are to study the general question of tillage in Bundelkhand, both generally and in relation to *kans:* to make use of some of the inferior soils; to ascertain what varieties of crops are best suited to the district; and to increase the diversification of cropping. Permanent experiments are not laid down.

5. *Investigations at the Aligarh agricultural station.*—Here too permanent experiments have not been laid down. Various experiments are in progress to test varieties and methods of cultivation of cotton, maize, groundnut, wheat, sugarcane and juar, the experiments with cotton being the leading feature.

6. *Investigations at the Partabgarh agricultural station.*—Here again permanent experiments are not contemplated. Most of the experiments in progress are connected with sugarcane and the processes of making sugar. The chief field experiments with cane are the trial of varieties, and determination of the effects of thick and thin sowing. Varieties of rice, maize and hemp are being tested for suitability to the locality and jute is also being tried. Methods of checking erosion on the edge of ravines and improving the grazing thereon are also the subject of experiment at one sub-station; and the use of gypsum on alkaline land at another.

7. *Investigations in charge of the Agricultural Engineer.*—The main lines of investigation are two: the determination of suitable forms of masonry wells, and the correlation of discharge from a spring-well with thickness of foundation-clay.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